

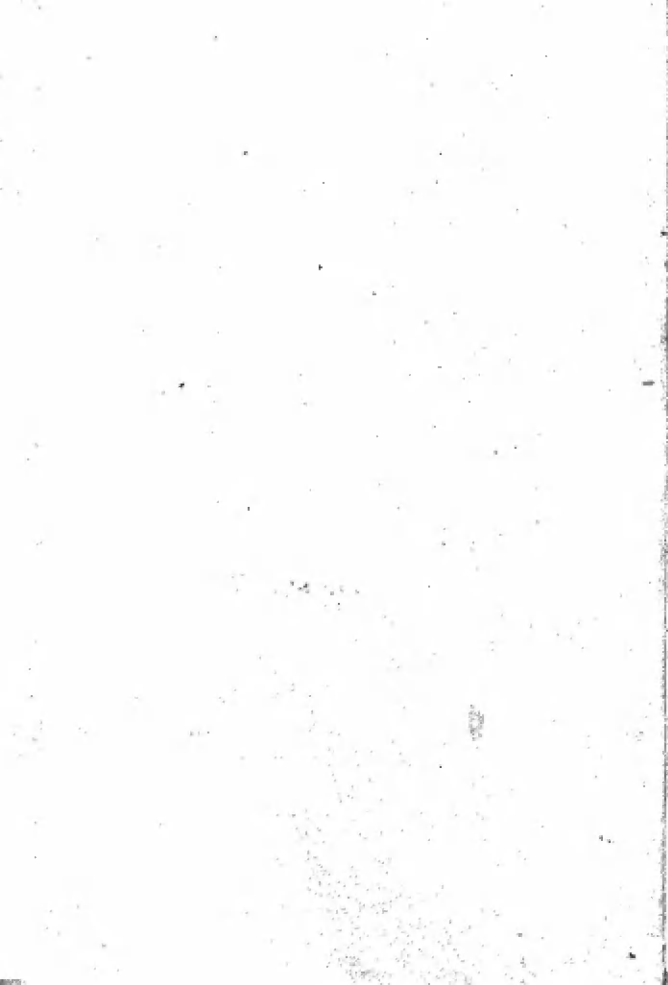
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THE CULTURAL HISTORY OF THE HINDUS



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PREFACE

To assess and evaluate an ancient civilization and culture, ranging from 2700 B. C. (Mohenjo-daro period) to 648 A. D. (Harsavardhana's time), is no light task. Culture is the inflorescence of various complex factors of race, race fusions, environment, land, climate and the stimulating effects of actions and re-actions of foreign contacts. Egyptian civilization has been dominant between 3000—500 B. C.; Babylonian and Assyrian between 3000—558 B. C.; Mycenaean between 2300—1102 B. C.; Hittite (Khatti) between 2635—717 B. C.; Persian between 551—331 B. C.; 224—637 A. D.; Chinese between 2205 B. C.—1270 A. D.; Greek between 7th century B. C. to 234 A. D.; Roman between 75 B. C.—718 A. D.; Arab between 8th—12th. centuries. Sometimes civilization has bloomed and prospered in the wake of imperialism, racial and trade expansion; for victory in decisive wars adds to the wealth, vitality and leisure of the conquering peoples, due to exploitation of the conquered territories; and success in war is also generally dependent on superior technical and scientific equipment, co-ordination of arts and industries, and organizational discipline and talents, as exemplified in the cases of the Persians, Greeks, Romans, Chinese of Han Period, Arabs the Spanish, French, English and Americans. But not infrequently during peace under an able and enlightened regime as of Maurya Asoka and of Guptas of India, as well as of Sungs of China, arts and culture flourish as the natural expressions of the innate genius of the people. India's culture has influenced other cultures, and in turn has been effected by them and their cross-currents. But of all civilizations, India's and China's alone, numbering in population more than $\frac{1}{2}$ of humanity, in spite of storms and stresses of foreign subjugation and exploitation for centuries, have preserved with undiminished vigor the historic continuity of their cultural consciousness. In this book, though the subject is very difficult and intriguing, setting aside all popular misleading conceptions, I have sincerely tried to show dispassionately how India's culture is indebted to others and how her natural genius has expressed itself.

THE CULTURAL HISTORY OF THE HINDUS

1.—ARTS

The imitative instinct is strong in man, the source of his progress. And art is an attempt to express and interpret life and its surroundings in its various aspects. It thereby reveals its advancement and culture as well as its æsthetic evaluation through the harmony of space and colours. Pottery is one of the most ancient of arts. The primitive man learnt soon to utilize such clay as he found on the river bed or on the ground, and then beating it with his hands began to fashion it into shapes according to his needs or fancy. It was first hardened by drying into the sun and used for various domestic purposes. But he soon learnt that by the use of fire, the baked clay vessel became as hard as stone and took on various tints according to the chemical contents of the clay. Thus colour decoration arose. The art patterns and decorative designs tribes in their migratory movements have introduced from place to place, and they have often been borrowed by their neighboring tribes and sometimes modified or improved upon. Round closed kilns with round holes in the upper chamber for baking pottery have been found at Mohenjodaro (Mac. 50), closely resembling the pottery kilns of Kish of 2800 B. C. or earlier.

The black triangular designs, juxtaposed to the point on the red surface on the Mohenjo-daro pottery (MI.—88) and the wavy lines (MI 90), and long-horned ibexes (MI 89, 92) are strikingly similar to those found in Nazirabad and Moussian-Elam of an earlier time. One unicorn urus ox (*Bos primigenius* or *nomadicus*, found among the bone remains of Anau) with elongated body and with stripped outstretched neck found on a seal (FE 82-98 : MI 102-109) resembles closely findings at Kish, Ur and Djokha. A bull having the characteristics of rhinoceros eating before a manger with pupped up tail resembles those of Tello and Ur. A short-horned bull is garlanded (97, 23). Humped bulls

are very well executed on seals (Pl. 111, 337-339). On a fragment of a Gudea sculpture (2400 B. C.) a humped bull is delineated.

The tall figurine with slender waist (Pl. 55, 5) looks like a Mycenaean of Crete. Statues 98-98 are brachycephalic with prominent nose and the nasal bridge is in line with the retreating forehead of representative Khatti (Hittite) type.

The statuette (Pl. 10) of red stone is well executed with wonderfully truthful modelling of the fleshy parts, especially of the prominent abdomen; there is subtle flatterring of the buttock and clever little dimples of the posterior superior spine of the ilium; unfortunately the head is missing. The statuette (Pl. 11) is the figure of a dancer, standing on his right leg with the body from the waist upwards bent well round to the left, both arms thrown out in the same direction and the left leg raised high in front. The pose and modelling are excellent, full of movement and swing. The linga (Pl. 14, 2-4) and yoni (13 7) are pretty realistic. Australoid: Figs. 2, 11; Mediterraneans: 6, 7, 9; Caspian: 9, 26; Palae-Alpine: 13; Alpine: 8, 3-22. Wheeled toy pottery and bronze carts have been found at Mohenjodaro and Harappa (Pl. 181, 154). There is a chariot pictured on a limestone slab at Ur of about 3000 B. C. In Capadocia it appears between 2100-1900 B. C. with a representation of a 4 wheeled chariot drawn by 4 horses. In Egypt Hyskos introduced it in 1800-1500 B. C. Cornelian disc beads (Pl. 137, 61) of good red color is rare though they were very common during the early periods of Sumer and Egypt. Jade beads (Pl. 135, 19) are rare as it is found only in the Pamirs, E. Turkestan, Tibet or N. Burma. That Mohen-jo-daro had communication with Central Asia is indicated by the pottery heads with typical Mongoloid features (Pl. 76, 2-4). Glazed quartz disc beads (pl. 138, 38-56) are rare. The technique of glazing quartz was known in predynastic Egypt. Barrel-shaped pinkish limestone beads (Pl. 137, 27) are common. Limestone of this colour was used for beads and occasionally for stone vessels in early predynastic period of Egypt; and both pink limestone and pink marble were very frequently used for making the archaic seals of Sumer. Lapis lazuli beads (Pl. 137, 18) are rare; but those found are exactly like the numerous Sumerian beads of 2600 B. C. and earlier, from which Mohen-jo-daro got them.

Sumer used to get its lapis lazuli from Persia. Afghanistan as a source of its supply was not then known. Beads of green felspar or amazonite (Pl. 137, 21) are rare. But it was a common ornament in the neolithic settlement in Fayum and pre-flood strata of Ur. From these sources it is likely Mohenjodaro got its found beads. Its source in the Nilgiris was perhaps unknown that time. The fine white onyx beads, veined with black (Pl. 136, 18), are rare, though it was very popular and common in Sumer, and being of the same shape, they are likely to be importations. Ear studs (Pl. 136, 90) made of faience are common, similar in design as found on pottery of the first period of Susa and on a royal gaming board from the temple repository at Knossos. A stud of very similar shape made of chrysocolla has also been found in a middle neolithic deposit of Knossos. As no nose ornament has been found in any pottery figurine of Mohenjodaro and Harappa, it seems that the stud was only used for ears. Anklets were at least worn by women of Mohenjodaro. The little bronze foot (Pl. 73, 5) and pottery figurine (Pl. 75, 10) show them distinctly. Men might have also worn it as indicated by the broad band of pitting on ankles of the stone statue (Pl. 71, 30). The curvature of the anklet on the bronze feet exactly resembles that of the anklet of a figure on a fresco at Knossos. Anklets made of strings of minute gold beads are known from Egypt in prehistoric times. Elaborate anklets have been found in Egypt in the tomb of Hetepheres, consort of Snefru before 2500 B. C. Anklets were certainly worn by Hittite officials of 10th century B. C. as proved by a carving found at Babylon. In the Markes burials 3 to 5 anklets have been found on each leg. Combs (Pl. 91, 25-26) with fine teeth cut with saw, either to fasten the hanging hair like modern hair slide or remove vermins, were used as a hair ornament. It is still worn by Kandians. One similar comb has been unearthed at Badari in Egypt. Cubical dice (Pl. 142, 84-5), made of ivory or pottery with number 1 opposite 2, 3 opposite 4, 5 opposite 6, are numerous. A similar cubic dice with numbers have been found at Tell-el-Amarna of Egyptian 18th Dynasty. In an early stratum of Ur, cubical dice have been found, but in the place of number one, there is a rosette, a frequent motif in early Sumerian art.

Tabular rectangular dice, made of ivory or bone (Pl. 138, 43), their bodies marked with concentric circles or other designs by light incisions filled with a black pigment. Ball and marbles (Pls. 90, 47; 125, 2) made of stone or ivory have been found. They were used as play things in predynastic Egypt and in Sumer. At Jemdet Nasar have been found a number of pyriform marbles of pink limestone. The copper axes of Mohenjo-daro (Pl. 182, 36; 40) were cast and hammered for sharpening as in Egyptian middle prehistoric period.

The weights have the following ratios: 1, 2, 4, 8, 16, 32, 64, 160, 200, 820, 800, 640, 1600, 3200, 6400, 8000, 128000. The unit weight has the value of 1570 gms. and the largest weight .0970 gms. The socketed axe-adze (Pl. 120, 27; 122, 12) resembles closely the axes-adzes from Tepe Hissar. On one of the axe-adze there is a seal of engraved spoke wheels, quite common in Sumer of about 1600 B. C. The white marble seat with inverted animals engraved with the aid of a drill (Pl. 100 b, c.) seems to be of Sumerian origin as the art of making inverted figures with drills working on hard stone was unknown in the Indus, but common in Sumer. The mat designed engraved steatite vessel (Pl. 142, 45, 48) appears to be also of Sumerian manufacture, as it was very common there; and unique in the Indus. Bull-legged stools (Pl. 87, 222) were in Egypt and Sumer the royal seats of authority. The couch with bull's legs as seen on a fragment of a stela from Tell Asmar was the nuptial bed of a divine pair. The recumbent female figurines on small model beds (M. 95, 17; 153, 25) represented in Egypt royal concubines who were buried with their master to provide him with the pleasures of life. In Indus valley there was no such religious conception or institution. The curious method of laying bricks flatly on vertical bricks (Pl. 22, 2; 23, 7) is found also in masonry of Ur-Engur and Warka. The two faced figure (Pl. 76, 8) seems to be based on Hittite and Sumerian seals. In Sumerian seals it was but a conventional device to show respect to the deity and the person before the deity. In ancient Egypt god Amun is sometimes represented with two hypocephalic human heads of which one is turned to the right and the other to the left. The Greek cross on seals (Pls. 83, 1; 86, 56) resembles closely the pattern on the cup board in a fresco in the Propy-

laeum at Knossos. It is incised on the spindle whorls from the lowest levels at Troy. It is depicted on the early pottery and seals of Sumier and Elam. Toy animals, chariots, whistles and rattles were well-made of numerous designs, indicating that Mohenjodaro peoples had not only built excellent cities, which could not exist without well-organized agriculture and industry, they were also very fond of children.

At Harappa fractional burial of collected bones after the body has been exposed to beasts and birds (Alpine type). Jar burials of later date. Lambs, goats, chickens offered to the departed (Mycenaean). The trefoil patterning on the robe of statuette (Pl. 93) is identical with Sumerian Bulls of Heaven. The copper sketching of a man wearing a leaf garment holding bows in his hands with horns on his head may be identified with Sumerian Enkidu. A toilet set comprising a piercer, earscoop and tweezers, found in a late period at Harappa, is identical in pattern with one from the First Dynasty cemetery at Ur. The bronze saw with curved cutting edge (Pl. 137, 7) has its closest analogue among the most primitive saws of Egypt. Mace is Mesopotamian and Egyptian. Aryans had coat of mail and helmet. The footwheel for producing pottery, used in Sind, is exactly of the same pattern as that is used in Bahrein Islands, Mesopotamia, Syria and Egypt. We know from a basrelief at Philae that it was used in Egypt in Ptolemic times. But the cart wheel spun by hand was used in Egypt in Fourth Dynasty and which is used even now all over India, excepting Sind, Baluchistan and the Punjab where only foot wheel is used. Cow-goddess—Hathor—Baby. Nin-khursag, Fruitful One, the lady of the gods (Ur excav.). In terracotta and stone statuettes (Pl. 93-100), the nose is not only prominent, the bridge of the nose is on a line with the fore-head (Khatti type). Terracotta figurine (95,9) has Egyptian looking beard at the chin. A long coil (Pl. 95, 21-25) of hair is wound round and round on the top of the head and there are two other coils on either side. The custom of wearing coiled plaits at the sides of the head is well-known in Babylonian statuary. Another unusual feature is the scarf which is wound twice round the head, with its ends left to hang down in modern choker fashion. The nude terracotta figurines with fan-shaped headdress wearing

head necklaces, having prominent breasts, sexual organs and pubic hair, sometimes wearing girdles and having exaggerated hips, but of crude make, found at Mohenjodaro (Mac. 75, MI. 94, 95, 169). Harappa and Peahwar, resemble those of Ur and Susa (74 A, B, C, D : Pope : Persian Art, Vol. 6). The relief of a nude Mother Goddess on gold leaf with wasp waist, prominent breasts, marked vulvar cleft and pubic hairy triangle found in grave of 7th century B.C. of Laurya Nandangarh in Bihar has striking resemblance to the terracotta figurine (18F) of Susa (3000 B.C.) and of Astrabad Turang Tape (2500-1500 B.C.).

The lotus buds and flowers have been used on the stone column capitals of the Egyptians from very early times. The Babylonians added palm leaves to them. The Achæmenides borrowed the design from them in their columns in Persepolis. The Maurya Guptas (Moor Copts, Gk. Μορσις; ancient Egyptians called the Copts *Gabî* and Gopta, Gk. αἰ-Γυπτίαι) adopted this Mesopotamian design on their Sthambas of Prayag, Sankisa and Rampurva. Later it has been copied in Mathurā, Sanchi and Gāndhāra. Sitting and flying geese (*hamsa*) decorate the Asokan abacus of Tirhut and Rampurva on polished monolithic sandstone shafts of Chunar. Later they are found at Sanchi, reliques of Kaniska and vajrāmāna of Mahābodhi, at Bamian and at Anuradhapur. Achæmenides used them. They are found in large numbers in Babylonia. They are found painted on the footed goblets of Nihavand of about 1500 B.C. (7 A. B.) and in Egypt (Gizeh and Saqqarh). The bull-headed capital of Susa and Persepolis on palmate bell-shaped abaque resemble those of Sanchi, Barhut Gandhara. Winged bulls and lions were common in Babylonia. We find them on capitals of Sanchi (Stupa I), Amravati, Jaggayapeta and Mathura. There are winged bulls at Mavalipuram and Bhairavakonda, like those of Babylonia. The corvelled arch of Ur is imitated in Mohenjodaro (M I. 40, 55), but the true arch of Khorsabad was not known in India for a long time. The egg-shaped wooden roofs of Lycian sarcophagus, also sculptured in stone, at Antiphelios, Pinara, Myra, are closely imitated in the cave temples at Nasik, Karli, Barhut, Lomasa Risi and Mahāvalipuram. Numerous terracotta toys of

animal and bird designs have been found at Mohenjodaro (Mac. 78-81.) and at Chanhudaro. The axe-adzes (Mac. 123) are similar to those of Luristan and at Tepe Hissar. The small model beds on which a concubine reclines (MI 95; 158) are quite like those of Sumar or Egypt. There they were buried with the dead with the idea of providing for the next world. A sheep carved on the Seal (Mac. -94) with long tail is identified with Egyptian *Ovis longipes*. Though buffalo (*Bos bubalis*) was domesticated (Mac. 50), no model of cow or calf either in pottery or seal has been found at Mohenjodaro in contrast with the find at Ali Uburid where both cows and calves appear. Mother goddesses are represented as wearing cowries as in Egypt where they were used as fertility charms, especially during the Middle Kingdom. Babylonian Ea had the upper part of a man and lower part of a fish. A similar Khatti basrelief has been found at Tell Halaf. Gk. Triton had the upper part of a man, and the lower part of a sea-dragon. At Balbek, Pergama, Greece and Rome two legs of Triton are tapered into two hissing serpents. At Mahabodhi there is a serpent-goat with male human upper part. At Gandhara the serpent-goat with male human upper part is winged. At Ajanti and Badami there are paintings of pretty damsels whose legs taper into serpent tails. At Mathura the Nagini is winged. At Mathura, Gandhara and Saranath two legs of a man taper into two serpents. Greek horses and bulls, sometimes with wings (in Munich Museum), have serpent's tails, and damsels ride over them. At Serinda, Oazil and Taxila there are winged horses with serpent's tail. At Barhut a bull's hind part tapers into a serpent's tail. At Barhut and Mathura, the elephant's hind part tapers into a serpent's tail. At Mathura and Taxila damsels ride winged lions with tapering tails. In Corinthian vases there are paintings of winged damsels with the tail of serpent, the wings having the resemblance of serpents' hoods. At Barhut, Amaravati, Mavalipuram, there are pretty nude maidens, their lower parts tapering into serpent's tails; there are hoods of serpents over the head instead of Corinthian hooded wings on the sides. Like the Babylonian winged lions and bulls as pillar-base, there are similar pillar bases at Bhairavakonda, Kancipuram and Mavalipuram.

Like the Kassite winged Centaurus on the Boundary Stone or other human headed Babylonian, Syrian and Mysian animals, there is a human headed tiger at Mohenjo-daro; there are human headed winged lions at Mathurā; human headed bulls at Sanchi, human headed horses at Sanchi, Mathurā, Gandhara, Konarka. And like Egyptian and Khatti sculptures, there are horse-headed maidens at Pataliputra, Mathurā, Mahā-bodhi. At Karkemish there are eagle-headed Khatti winged human beings, supporting the heaven with outstretched hands, and winged human beings with outstretched hands at Tell-Halaf. In Greece of 350 B.C. nude Ganymedes is carried away by Zeus in the shape of an eagle, and at Corinth a nude damsel is carried away by an eagle. At Gandhara eagle is similarly carrying away a man. In Egypt female-busted (Neckhet) vulture is goddess of love and fertility. In Babylonia voluptuous Isia (Louvre Museum) has the feet and wings of an owl. In Lycian a human busted female is feeding a baby from her breasts, clasping it in her arms. At Sanchi, Gandhara, Ajanta, Amaravati, Kāncipuram, nude flying Gandharvas with seductive human busts but with wings and claws of birds, genii of joy and love, play on lyres or have garlands of flowers in both or one hand, and holding aloft a basket of fruits in another. The Khattis had winged men holding aloft the sky with their outstretched hands as at Karkemish, Tell Halap and Eilatour Boander. At Athens, Apame of 2nd century B.C. and at Pompei, there are the same atlante figures but without wings and in kneeling postures. In Babylonia the atlante human figures are in standing postures, but without wings, though wearing a feather-patterned dress; in Persopolis they wear ordinary dress. At Barhut, Mahābodhi, Gandhara, Amaravati, complete males and females in half-kneeling postures form the base of columns; they become regular Yaksha and Yakshi, possibly patterned after the Egyptian Bes who is a pot-bellied dwarf, fond of music and a dancing, giver of blessing, and his nude consort, tall female Bes—Beset, 2000-1600 B.C. of 12th dynasty. Men are usually pot-bellied (Kubera), in happy joyous spirit, trampling demon of winter and misery under one of its feet; the females are seductive figures in various voluptuous poses, either holding with their hands branches of trees or gathering flowers or fruits, or

holding baskets of fruits. The double-headed eagle of the Khattis, found at Boghas-keni, Buyuk and on a baserelief of Isailikais find imitation at Kerkouk, Kasil, Taxila and Tanjore. On a Gudea seal found at Kish is depicted a water jar from which two jets of water are flowing and at the juxtaposition of the jets there is a budding flower. In a Sumerian plaque found at Tello, there is a similar jar, but two fishes are ascending the flow of the jets (Aquarius). In a Loristan bronze similar jar, on the body of the jar there are fruits, flowers and a leafy plant. At Bamiyan, Sanchi, Sarnath, Mathura, Amaravati there are pretty water jars, often in the hands of lovely damsels, on which there are flowers, fruits and leafy branches. Whether Gandharva and Angel have evolved from eagle (Aquila) abducting Apsara (Aquarius lacking first magnitude star Altair of Aquila took its place) or have been transformed from Ishtar; Mangala Kalasa (water jar) has independently developed in Mesopotamia and India from Aquarius; human headed bull or horse from Sagittarius or Centaurus; winged bulls and lions from the combination of Aquila with Taurus or Leo.

Asoka as viceroy of Ujjaini halted at Vidisa where he married one Devi, daughter of a local Sresthi and by whom he had two sons—Ujjaniya and Mahendra and a daughter Sanghamitra. Before Mahendra headed the mission to Ceylon he visited his mother at Vidisa and was taken by her to Cityagiri (Sanchi) where Asoka himself set up a Stupa and pillars 25, 26, 35 (3-5, Pl. 2 and 3 shrines, Pl. 7, 10, 10, 17, 18, 31). The Parkham statue is regarded by many as a portraiture of Sisunaga Kunika Ajatasatru. And it represents many (Sees—) Hsieng-nu characteristics. The Elephant of Dhauli was carved out of the rock and on which are inscribed the edicts of Asoka (258 B.C.) The lion-crowned columns of Basrah (241 B.C.) and of Lariya Nandangarh (243 B.C.) have not the fine execution of the 4 adorsed lions supporting a wheel of laws of Sarnath (242 B. C.) on whose abacus with 4 wheels of laws there is a zebu and an elephant and horse and lion. All these columns (nearly 40 ft. high) are of Chunar sandstone, polished almost like the surface of the glass. Sanchi lion capital is similar to Sarnath, but it is not like the former; and it has four geese on the abacus (245

B. C.). But the elephants and the Yakshis of the front of the Eastern (44) Northern Gateway (25, 26, 27) are very life-like and naturalistic. Animal designs like that of peacocks, winged ibexes, lions, winged horses, monkeys are spirited and excellent. On the pillar of Sanchi Northern Gateway (36, 52) there are Mauryas, one picking a bignonia flower, the other holding some lotuses in his right hand of Caspian type. There are two excellent atlantes on the Southern end of Western Gateway. There are two Maurya princes of polished Chunar sandstone of grave countenance (Ind. Museum). A slender waisted, large bodomed and hiped maiden, waving a yak tail in her right hand, wearing a fine necklace and ornaments in the hair, puffed up with yak hair, has been found at Didarganj. It is excellent and natural. It shows how Maurya women used to dress and wear their dress gracefully, but keeping the upper parts of the body practically uncovered. Two mall heads of polished Chunar sandstone, wearing a turban and earrings, have been found at Sarnath, one helmeted terracotta head of an army noble (Sar. M.). There is a spirited goat in the centre of a medallion with inscribed early Brahmī characters (S. 104). The Sunga (Sung = Tang) sculpturing, though not so excellent like the Asoka, is fine, natural and well-proportioned. The Sungas as depicted in the Barhut and Sanchi Stupa portrait sculptures have ellipsoid cut of face. The men wear heavy turban. The females are comely and decently dressed and wear becoming light ornaments. There is a woman warrior putting a tight coat and skirt and a heavy sword in her right hand. The cheekbone is rather high, indicating Mongolian mixture. There is a female flag-bearer, riding a spirited horse, the standard consisting of the upper part of a maiden and the lower part of a birds. There is at Sunga pillar at Sanchi, about 15 feet from ground level; upto height 4 ft. 7 in. the shaft is octagonal and above that 16 sided. The Sungas built a temple at Sanchi whose pillars on the raised platform can be seen (S. 117). Garuza pillar of Basnagar (100 B. C.) seems to be of Gk. design, but of Sunga workmanship. The Bo tree and the Birth of Bodhisattva basereliefs of Barhut are excellent products. Mathura sculptures are of Kushan (Chinese Kaohshin = Choushin = Tib. Kaishin = Yuechi = Tocharian Aryan) patterns. The statues

of Vemia Kadphises and Kanishka wearing trousers and overcoats, macosan shoes with upturned toes are of excellent make. The female type on the Torana architrave from Kankali tila, putting on trousers and heavy plaited hair locks on the back is very fine. Two Kushan maidens represented as Yakshis on jambs of Bhuteswar (Math, Mu) are the finest creation of Aphrodites. No less attractive are two other Yakshis from similar two jambs, now in Indian Museum.

At Buddha Gaya corner past of the Stone Hedge of 100 B. C. there is a man helping a maiden to climb up a tree. The slender, pretty ellipsoid-faced figure shows excellent anatomical knowledge and superb workmanship, revealing her organic whole in an undulatory wave of beauty. Amaravati sculptures represent the Andhra type. In the north eastern jamb there are figures of a pair—husband and wife—of good execution (Sativahana—Sianka nāga—Sisunāga—Sces—Hsiangnu). Women in the Bath as relief sculpture of 2nd century A. D. show fine anatomical knowledge and workmanship; but the women are wearing very heavy ankles. The basreliefs of Andhra king and queen at the verandeh of Chaitya hall of Karli of first century B. C. are very life-like and striking. At Sanchi there is a fine statue of a standing Naga prince of Alpine type with a seven hooded serpent hood and coils on the back. There is a Nāgi with left hand on knee wearing a skirt fastened with a beaded girdle round the hips, heavy anklets and a long jewelled cord reaching to the knees.

There is a pillar at Sanchi, splashed and streaked with purplish brown Nagouri quarry. It was composed of two pieces, one compressing the circular shaft and square base, the other bull capital with abacus containing geese, on which there are four adorsed lions on the top of which there is cakra with highly polished surface. There is another pillar by Vakataka Rudrasimha whose statue stood on its bell capital. Gandhara sculptures show Hellenic influence, but it is lifeless and decadent. However a bronze statuette of child Harpocrates, gold repousse figurine of winged Aphrodite, Dionysus head and clay figure of a Tatar are excellent. Kushan art was a synthetic product, and so called Gandhara and Mathura schools really belonged to them. Gupta kept alive, if not improved on the Kushan art. Their archi-

fecture was fine of noble proportion with nice pillars, naturalistic as the Bhumra (Nagod), Tigowa (Jubbulpur) and Mundesvari (Shahabad) and Dasavataca (Jhansi) temples show. Garura pillar and Varaha image at Eran (C. P.) are striking examples of their artistic talents. Buddhas at Sarnath, and at Sultanganj, at Menkower; Ekamukha linga (Nagod); Nāgi at Maniyur Math (Rajgir) and Matri Devi at the Varaha cave at Udayagiri (Bhilai) are very naturalistic. The Khiching (Mayurvanj) basrelief of Buddha, and the female figures; mother and child of Bhubaneswar (In. Mu), and Kanarak temple and animals, Lingaraja, Rajarani and Ananta Vasudeva temples of mediæval Orissa (11th century) are vigorous and clever. Rukamini sandstone effigy of Nokhas (Etah) of 10th century A. D. is delicate as marvellous; the pose is quite modernly. Cola sculpture in the niches of the Nageswara temple at Kumbakonam (906-957) of the Cola king and the queen seen to be actually well modelled from life.

Buddhisattva of Sanchi of Gupta period (Vic. Mus), Buddha of Anuradhapur of 4th century A. D., 4 worshipping women of the Buddha feet of Amaravati of 2nd century A. D., effigy of Parakram Vāhu of 12th century of Polonnaruwa, bronze figures of Krishnaraya of Vijayanagar (1510-29) and his two queens of Tirupati, a stone relief of two lovers of Anuradhapura of 6th century, the copper statues of Manakya Saiva saints, Manikya vacagar 11th century A. D. and Sundara Murtiswami, Nagini from Mukteswara temple of Bhubaneswar (11th century), of Gantami putra Satakarni of Amaravati (2nd) A. D., relief sculpture of Pallava Simhavishnu (575-600) and Mahendravarman (600-25) with their queens at Adivārha cave temple of Mahavalipuram and Narasimhavarman (625-650) of Mahavalipuram, king Vikramaditya (738-47 A. D.) and his queen Trailakya Devi on pillar of Mallikarjuna temple, bronze statues of Chola king Rajarajas (Rājarājeswara temple) and his queen Solaman Devi are naturalistic portrait sculptures.

Ajanta fresco paintings range in date from 50 A. D. to sixth century. But majority of the paintings are of the Vakatakas (cave 18) and of Chalukyas (560-642). A group of foreigners in the ceiling of cave I, representing the presentation of the credentials from the Sassanian envoys of Khushru to Pulakesin in 36th year of his reign in 625 A. D., a woman carrying a child

(C. 17), a king with female attendants (C. 10), a standing female (C. 2), a seated saluting woman (C. 9) are some of the best in the world that were painted before 14th century. Ellora rock-cut sculptures of Kailāsa are very dignified. The stone-hedge at Buddha Gaya, set up by king Purnavarman of Magadha, has the representation of the sun by a rayed disc or spoked wheel with a turbaned charioteer, with two bowman, driving one wheeled chariot by four horses and surrounded by zodiacs; a sprited humped bull; a man and woman making love, the man holding up flowers in his right hand and mace lying at the back of the woman (Gemini); a bowman with the body of a anistope, the tail of the anistope being bent to form the bow (Sagittarius); the weighing tradesman without the balance (Libra), an elephant-faced crocodile (Capricornus) and other appropriate signs.

Egyptian art was very well advanced. The colonades with lotus symbols and basereliefs on them of Deir el Bahari and Luxor (18 D-1500 B. C.), of Karnak (19 D-1250) are masterpieces. The rock temple of Ramesses II with his gigantic portrait sculptures and sculptured columns as pillars of (19 D-1250) are marvellous. Predynastic ivory figurines with prominent hairy pubic triangle, broad hips, sometimes feeding a baby from the breast (Br. Cair. M) are rather archaic. But the seated figure in darkgreen diorite of Khephren with a spreading protecting eagle, behind his head and the seated painted limestone figurine of Nofret from Medum, show well executed typical Alpine faces (19 D-2800 B. C. C. M.). All Fourth Dynasty sculptures show naturalness and dexterity as the alabaster head of Shepseskaf and red granite head of Sekhem-ops (Bos. M), the seated figurines of Scribe (Bos. Leyden, Ber. Cair.) are quite modernly. With Fifth Dynasty there is a decline. But the painted limestone statue of Ranofet (2650 : Cair. M) shows a Caspian type with formal rigid outlines; however some wooden statues are well made (Cair, Bos, Ber M). But during the Sixth Dynasty a painted limestone woman brewing beer of Saqqara (2530 : Florence) and an Alpine maiden grinding corn in painted limestone (Flor. Ber) in their expression and vigour are some of the best of antiquity. But again with the Twelfth Dynasty there is revival of sculpturing. The

head of Senusret III in red granite and his mother Norset from Tanis (1800 B. C.) show forceful Caspian type of faces. Senusret's face appears in diorite as Sphinx, like that of his descendant Amenemphet III. Wooden statuette of Imert Nebes (13 D-1800 B. C. Ley.) is very fine. The limestone seated figure of Hatshepsut from Deir el Bahari (18 D-1800 B. C. New Y. M.) shows her fine intelligent and spirited face to great advantage. Eighteenth Dynasty is noted for many fine sculptures: limestone functionary (Birmingham), Ptahmai (Ber. M.), a female (Flo.), Golden Amon (New Y. M.), God Khonsu (Cairo), Amenhotep III and his pretty wife Nofreteta in brown sandstone (Ber. M.), Akhenatonr. (Br. Cair. M.), a man reading (NY. M.), Tutakhamun on a black leopard (Cair. M.), Ramses II in black granite (Turin), and priest Nefes with his mother Nefret (Munich) of XIX th Dynasty are masterpieces of sculpturing. Not only in human sculptures and paintings, but also in animal designs the Egyptians excelled. Limestone basrelief of ibexes and antelopes of Saqqara (3 D-2950. Ber. M.) can hardly be improved upon. Fifth Dynasty improved over the third. Limestone basreliefs of wild animals 2650 Ber.), hunting hippopotami among papyrus plants of Saqqara, showing flying birds, fish etc. and hunting wild animals (tomb of Ptahotep), peasant women coming to the market balancing vegetable baskets on their head or dancing girls in the tomb of Neukheftka, wrestling boys, thrashing donkeys and cranes in the tomb of Ti at Saqqara are life-like. Limestone basreliefs of mourners in the tomb of Memphite priest (18 D 1850 B. C. Ber. M.), and scribes (Flor) and the head of a horse (Ber. M.) and two damsels with lotus flowers in their hands (Louvre M.) are simply grand. Mural painting of Geese in a meadow in Medium tomb of IV th dynasty (2900 B. C.) almost appears like a photograph. Ball game played by girls riding over girls' back, singing birds on a tree, a female weaver, two wrestlers (Beni Hasan tomb of 12th D-1900 B. C.) are very striking. The presentation of a herd, the Book of the Dead illustration, garden with pond at the rock tomb of Thebes, wild ducks at Tell el Amarna (Ber.), women mourners of Them ladies, servants of the spoils of the chase and chariot driving with a spirited horse are mural paintings at Thebes of the 18th

Dynasty. 19th Dynasty did not lag behind which are testified by the mural painting of noble women and sketches of a Negro and Syrians in the tomb of Seti (1300 B. C.). There is a fine painting of a lion hunt on a limestone splinter (New Y. 1200 B. C.) and a female acrobat (1180 B. C. Turin). There is a blue marble vase in the shape of double ducks (12 D=1800, New York M.) and a glass goblet bearing the name Thutmose III (1600 B. C. Mun.) and a polychrome glass vase in shape of fish found at Tell el Amarna (1370 Ba. Br. M.) and a bronze hand mirror mounted on the head of a nude girl, the disk silverplated on one side and gilded on the other (1400. Ber. M.).

Sung potters produced world's masterpieces of potter's art in colors and designs of their wares. They could make wine cups weighing less than $\frac{1}{8}$ of an ounce. The great factories at Changham where 500 kilns burned to supply the court with 9600 chinaware annually were the marvels of Sung porcelains. Chinese painting is also marvelous in accuracy and delicacy of lines; but it is rather suggestive than realistic. Sung landscape paintings are also masterpieces.

Hindu icons have been conceived after constellatory configurations. They have not been humanized as in Greece. So within their narrow confines, they have to be suggestive than realistic. They are the fantastic plastic projections of mental imaginary creations. When they are seen in that light, their significance can be perceived. In the hands of able talented craftsmen, they have sometimes been expressed with extraordinary vigor and force, but generally they are stereotyped without displaying any individuality. Only Assyrian animal designs, especially in hunting scenes in bas-reliefs, surpass the Indian in vividness of expressions. Otherwise the Indian animal sculptures, in various moods, especially of Bānchi, are the best, even surpassing the Egyptian whose human sculptures are no doubt superior. Greek sculptures are idealized harmonious expressions—effeminate and softened, while Roman sculptures are naturalistic.

2.—PHILOSOPHY

Philosophy is an attempt of synthesizing the available knowledge as an organic unit as to the origin and development of our existence. It may be mythological, theological, metaphysical or rational based on physical sciences, according to the age and cultural progress of the people. To primitive minds myths are sufficient to explain why and wherefore for everything. But to some inquisitive thinkers they do not tally with the facts of their observations. That creates doubts. And their restless thoughts are always on the quest to find out the truth. That is the basic source of knowledge or philosophy. It is called in Skt. Darsana (dṛis, dṛishti—Gk. derkomai = to look). Philosophy also tries to find out a rational way to ensure joys and happiness in life. Search for happiness by the gratifications of all natural cravings is instinctive in all animal existence. We often do not get all that we want. Nature intervenes between us and the realizations of our happiness. As long as we know not the forces of nature or how to control them and bring them to the well-being of our comforts, we worship them as different powerful deities or different manifestations of one supreme deity. Any organized attempt to solve the problems of life becomes philosophy. So philosophy passes through different phases of evolution with the advancement of knowledge. The philosophy of one people or one age may appear as the pusile sophistication to another. But the history of its evolutionary progress cannot but be an interesting study.

“Then there was no existence, nor not-existence. There was no air, nor sky which is beyond it. What was concealed? How, where and by what supported? Was there deep unfathomable water! (1) Death then existed not, nor life immortal: of neither night nor day was any token. By its inherent force energy throbbed; nothing else beyond that existed (2). Darkness there was at first by darkness hidden. Without distinctive mark this all was water. That which becoming, the void was covered. That one by force of that (tapas) came into being. Desire (Kāma) entered that one in the beginning, desire that was the earliest seed of mind. Their ray extended—light across the darkness. But was the one above or was it under! Creative force was there and fertile power. Below was energy. Above was impulse Rv. X, 129 (5).” “They yoke the seven (colors of the

rays) to the one wheeled car (the sun). The three naved wheel is ageless; never loosened whereon depend all these created beings, who has beheld the first one being born which being boneless sustains what has bones. From earth are breath and blood; where is the soul (Atman; Dirghatamas Rv. 1, 164, 103). Two birds, close yoked companions clasp close the self-same tree. Of these one eats the sweet fruit; unseeing the other looks on (20). The real is one though sages name it variously. They call it Agni, Yama, Matarasvān (46). Purusa has a thousand heads, a thousand eyes, a thousand feet. He filled the earth on every side, yet stood ten fingers length beyond (1). Purusa truly is this all what has been and what is to be, the lord of immortality. He was all that which grows by food. Such is his greatness or yet more; than all this is the Purusa. All beings are one-fourth of him, three-fourths immortal in the heaven (3). From his mouth was born the moon; from his eyes the sun born. Indra and Agni from his mouth while from his breath was Vayu born (13). From his navel was the Antariksaa. From his head rolled the sky, from his feet the earth and from ear came the space (Rv. X, 80, 14)." Aitaras (Etrurians, Lat. Iterum = Heb. Iter = Skt. Itara = Common people. According to Josephus (Ant. 12, 11, 3) many Itursans were conquered by Maccabees 175-86 B.C.) believed as expounded by their leader Mahidāsa a kind of evolutionary unfoldment: "The seed (development) of Prajapati (creation) is gods: the seed of gods is rain; the seed of rain is herbs. The seed of herbs is food (grains). The seed of food is living creature: the seed of living creations is the heart. The seed of the heart is the thinking mind; the seed of the thinking mind is the thoughtful speech; the seed of thoughtful speech is thoughtful action (Ait. Ar. 2, 1, 3, 1)." "Creatures are born from eggs (oviparous), born from womb (viviparous = mammals), from warm water (animalcules were supposed to be of spontaneous growth in a humid soil), and from buds (plants). Living beings are moveable (animals) and immovable (plants). Among the higher animals bi-ped man surpasses all the quadrupeds in ability. Therefore quadrupeds such as cattle, horses and elephants obey man's commands (Ait. Ar. 2, 6, I, 5). All animals reproduce themselves. Even plants when grown up bear fruits (Ait. Ar. 1, 2,

4, 14). Likewise life is incomplete and poor without marriage and children. So to have a son is the highest expression of man's worship. The debt father pays off by a son. And the father that sees the face of a living son attains immortality. By means of a son fathers ferry over the deep ocean. The self is born from the self to ferry over. What is the use of austerity, what of goat-skin, long hair and of devotion? Seek a son, O Brahmans; this is the world's advice. Food is life, clothing a protection, gold an ornament, marriage is secured by cattle. Wife is a comrade. Though daughter is misery, but a son is a light in highest heaven. A wife is called Jāyā, for he is born again in her. He is the begetter and she is reproductive with the seed placed within her. A sonless one cannot get to heaven. Even all the beasts know this. Therefore a calf mounts his mother and sister. This is the broad pleasant way along which men with sons fare free from sorrow; which beasts and herds eagerly long for. And for this even they unite with their own mothers (A. Br. 7, 13)." In Canaan at Gezer sanctuary large number of human bones of both sexes and all ages have been found. At Megiddo a pubescent girl had been slaughtered at the foundation of a large building and her skeleton has been found built into the wall, which is also testified in the Bible (Deut. 12, 31). Human sacrifice also prevailed among the Hebrews. Abraham offered his son Isaac (Gen. 22), Jephthah his daughter (Jg 11, 30). Hiel rebuilt Jericho upon two of his sons (1 Ki. 16, 34). Arab Meshe immolated his heir to Chemosh (2 K. 3, 27). The Arabs sacrificed their prisoners of war to Venus between the time of her appearance above the horizon and her disappearance in the rays of the rising sun. Assyrians sacrificed their prisoners of war to Samas of Sippar. Egyptians also sacrificed the prisoners of war to Amon (Memorial of Mentuherhepsut). The Romans sacrificed human beings in Latiaris festival and before Saturn. In times of national calamity Phoenicians sacrificed their children and in Carthage their bones have been found. The Greeks demanded the sacrifice of Iphigenia, because the detention of their fleet at Aulis by contrary winds, and Polyxena on the tomb of Achilles. Achilles slayed 12 Trojans on the funeral pyre of Patroclus. To Artemis of Triclaris a youth and a maiden used to be sacrificed. Scythians

sacrificed one prisoner of war out of every hundred. Slaves sacrificed every year Christians, choosing them by lot to their god Svantovit. Germans offered human sacrifices to Wotan to avert wholesale loss of life (Tac. Ger. 9). Hermoduri after their victory over Chatti offered human lives to Tiu (Tac. An. 13, 57). King Aunn of Upsala when growing old and sick sacrificed nine of his sons so that his own life might be prolonged in return. Cimbric women after victory sacrificed their captives and after the battle of Aransis (105 B. C.) the captured Romans were hanged upon trees. For making fire pits and for building palaces, there were human victims (Nrimedha) mentioned in T. B., the book of the Kathis (8, 4, — T. S. 6.5.1). Asvamedha also required the immolation of a human being (S. Br. 18, 8, 6). Aruna Anpavesi was a student of Andha Daumya, son of Daumya, the priest of the Pandavas. His son was Ushan Vājaśravasah Gautama Uddālaka Aruna. Uddālaka was a Katha. To Kathas we owe Taittiriya Samhita, Brahmana and Katha Upanishad. Uddālaka with Prācināsila Aupamānya (Kāmboja), Satyajitna Paulushi (Palasta), Indradyumna Bhallaveya, Jana Śārkarābhya, Budhila Asvalarāvi went to Kekaya Asvapati (the title of Kekaya or Madra kings) and Patāncala Kapyā of the Madras (possibly the same man) to learn Atma Vidya (Ch. 5, 11 ; Br. 3, 7). Kathas (Catti of Tacitus) like Carthagians and Canaanites sacrificed children in times of national distress. Uddālaka is supposed to have sacrificed his son Gautama Uddālaka Auruni Naciketas to Yama (Tait. Br. 3, 2, 8 ; Katha 1, 1-4). Uddālaka was a phallic worshipper. He believed "Prājapati created woman, and adored her yoni, and with his lingam he impregnated her." Consequently her mons veneris is the sacrificial altar. Her pubic hairs are the Kusa grass ; her skin Soma-press. The two labia in the vulva are the fire-bases. He who proclaims sexual intercourse with this knowledge performs the great worship (Br. Up. 6, 4, 3). This was not only the teaching of Uddālaka Auruni, but also of Nāka Maudgalya and Kumarabharita. (Br. Up. 6, 4, 4). For Birth Control with "the women whom one may desire with the thought 'may she enjoy love with me', but 'may she not conceive offspring' after inserting the member in her and joining lips with lips, he should first inhale, then exale and exclaim:

"with vigorous jets of semen I reclaim semen from you" (Br. 6, 4, 10). For a son, famed, a regular member of the councils, a sought for eloquent speaker, they should take a repast of rice boiled with meat and Ghee before sexual intercourse (Br. 6, 4, 18). For punishment of adultery Uddālaka taught the sorcery "if one's wife have a paramour and he hate him, let him put fire in an unannealed vessel, spread out a row of reed arrows smeared with ghee which are set ablaze, saying, you have made a libation in my fire, I take away your inbreath and outbreath, your sons and cattle, you so and so (Br. Up. 6, 13).

Svetaketu Auddālaki was the son of Uddālaka, begotten on his wife by one of his disciples. Uddālaka's daughter Sujāta was given in marriage to Kāśhoda Kānsitaki whose son was Astavakra. Uddālaka's son Svetaketu also learnt almost the similar doctrine from Pravāhana Jaibali of Pāncāla (possibly by this time Pāncāla, Delhi Agra region was conquered by the Madras.) "Woman is the sacrificial fire. The sexual organ is its fuel, the pubic hairs the curling smoke, the reddish vulva the flame. The penis is the amber. Orgasm is the spark. In this oblation gods offer semen from which Purusa (creation arises: Br. 6, 2, 7; Chan. Up. 5, 8).

Due possibly to foreign conquest Pāncāla Brahmins migrated to Videha. Videhas were Alpines but Mathava Videgha introduced the Aryan fire cult (S. Br. 1, 4, 1, 10). The court of its kings (Janaka; Ugrasena, Janadava, Dharmadyaja, become famous for philosophical discussions. Vojasenayi Yājñavalkya became the disciple of Uddālaka Aruni. And his pantheistic monism is a learned discourse with court priests Asvala (Jaratarava Arisbhaga (Naga), Bhujyu (Peji = Liockari), Lahyani, Ushasta Cakrayana (Kuru), Kāśhoda Kaushitakeya (son-in-law of Uddālaka and father of Astavakra), Gārgi Vacaknavi Maitreyi (whom he married though he had another wife Katyāyāni), Videgha Sakalya (the Padapatha maker of the Rigveda). He said to Maitreyi Gārgi: Not for the love of wife, wife is dear, but for the love of soul wife is dear. Not for the love of beings (bhūta) are beings dear, but for the love of the soul beings are dear. It is as of all the waters the uniting point is the sea; as of all touches the uniting point is the skin; as of all forms the uniting point is the eye; of all intentions (saṁkalpa) the uniting

point is the mind. It is as a lump of salt cast in water would dissolve right into the water, so verily this great Being (*Bhūta*), infinite, timeless, is just a mass of knowledge (*vijñāna ghana*). Arising out of these elements into them also one vanishes away. After death there is no consciousness (*na pratyā samvīśati* : Br. Up. 2. 4). The skin is the base of touch sensations; the tongue of tastes; the nose of odours; the eye of forms; the ear of sounds; the mind of conceptions; the heart of knowledge; the hands of action; the genitalia of orgasmic pleasures (Br. 4, 5, 12). The theism of *Kathā* (in *Kathā Up.*) is explicit. It ridicules the pretensions of the priests. "Abiding in the midst of ignorance, the selfwise, thinking themselves learned, fools, go about, in ceaseless unrest, like the blind men led by the blind (*Kathā* 2. 3). The *Ātman* is not born, nor does it die; from naught else comes it nor does become. Unborn, eternal, endless, this ancient is slain not with the slaying of the body. If the slayer think that he slays or if the slain think he is slain, both of them do not understand. This slays not nor is it slain (identical with the *Gīta* 2, 19, 30). Less than an atom, greater than the great, the *Self* is hidden in every creature's heart. To one utterly resigned the *Ātman* reveals its own glory as a self-expression. The bodiless among bodies, the stable among the unstable is the great and omnipresent self; knowing this the wise man sorrows not. Not by instruction may this self be gained, nor intellect nor by scripture learning. But to his chosen favourite *Ātman* reveals his true form. Who has not ceased from evil ways, who is untranquil and uncomposed, whose mind is not in peace, cannot obtain it by learning alone (*Kathā* 2. 18-24). Know that *Ātman* is the rider or lord of chariot, and the body is but a chariot. Reason (*buddhi*) is the chariot-driver and the mind (*manas*) acts as bridle and reins. The senses (*indriyāni*), they say, are the horses, the objects of sense (*viśaya*) are their path. The soul yoked with mind and the senses the learned call the enjoyer (*Kathā* 3, 3-4). Beyond the senses are sense objects (*artha*), beyond the objects is the mind. Beyond the mind is the Reason. Beyond the reason is the great self (*ātma māhan*). Beyond the Great is the unexpressed (*avyākta*). Beyond the unexpressed is the *Puruṣa*. Hidden in all living beings this self does not

reveal itself. Yet He is seen by subtle seers with fine keen intellect (*Katha* 8, 10-12). Not in the field of vision stands his form. By eyes no one can see him. Those who know him by heart, thought and mind, become immortal (*Katha* 6, 9). He makes us inhale our breath and expire ourselves. The Vāmana (dwarf as self or Egyp. Bes—Aryaman=Cepheus or Pur. Siumāra, the cosmic self) is seated in the midst whom all the Devas worship (*Katha* 5, 8) with root above and branches down in the eternal Pipal (*Aśvattha*=lunar shades) tree. That is the Venu (*Sukra*); that is Brahman that is called ambrosia (*amrita*: lunar radiation or immortality: *Katha* Up. 6, 1).

Ajātasatru, cousin of Mahāvira of Śiśunāga dynasty as viceroy of Kāśi which his father Bimbisara got as a dowery by marrying Koslika Devi, sister of Prasenjit, taught Driṣṭabalki Gargya who lived among the Matsyas, Kurus, Videhas (Br. 2,1,1, Kauś 4, 1), whose sister Gargi Maitreyi was married to Yājñavalkya of Mithila: "As from blazing fire sparks would disperse in all directions, even so from this self (*ātman*), the vital breath (*prāṇa*) disperse to their respective stations. From vital breaths sense powers develop (Kauś. 4, 20)." The Philosophy of Alpina Taittiriya was practical. "Acquire much food (*annam* T. U. 3, 9, 1). Food is Brahman itself (T. U. 3, 2, 11). Life is Brahman itself. Life is longevity, and preservation of the soul (T. U. 2, 8, 1). Acquirement of knowledge (*vidyānam*) is the highest form of worship. And with knowledge one gets contentment (*ānandam*). And *ānandam* is Brahman (T. U. 2, 8; 3, 5). *Chandogya* Up. developed among the Kurus who were harassed by enemies (Chan. 1, 10). They believed that in the beginning this world was merely non-being. Then it developed. It turned into an egg. It lay thus for an aeon. It was split asunder. One of the two egg shell parts became silvery, and the other golden. Silvery part is this earth. The golden part is the sky. The outer membrane became the mountains, the inner membrane cloud and mist. The veins became the rivers, and the fluid became the ocean (Chan. 8, 19). There is an important allusion that *Ghṛa Angirasa* taught *Devakiputra Kṛishṇa*: you are the indestructible, you are the unshakable; you are the very essence of life (Chan. 3,17,8). Yājñavalkya's disciple was Asuri. Asuri believed in Karma which evolves the soul into the higher plane

and thus advances the moral progress of man. The Ātman is the same in the ant, elephant and the whole universe. With the theory of Karma and immortality of the soul he made Janaka Janadeva his disciple. His other disciple was Pancasikha. Pancasikha told Janadeva that desiritude and death cannot be prevented under any circumstances. Sulabha, the beloved disciple of Pancasikha of Parāsara family, told Janaka Dharmadhyaja that by renunciation based on knowledge one becomes liberated; that union of man and woman is only sweet when based on mutual inclination; but if it be forced on the other it becomes noxious like a poison (Śānti P. 821).

There is a Pippalāda recension of the Atharvaveda. Pippalāda's friend was Kabandin Kattāyana (Pakudha Kaccāyana), a senior of Gautama Buddha. Prasna U. represents the views of Pippalāda. Soul dwells in the heart from which 101 arteries and nerve (सर्प) trunks branch out to 7200 capillaries and nerve endings through which soul transmits its regulating forces. *Mundaka* (of shaven heads-monks) Up. represents the philosophy of Satyavaha Bharadvāja. Bharadvāja introduced shaving of head and beard among his followers against the Brahminic Kesins and Jatilakas. Children in their ignorance jump and frolic for their amusement. Vedic sacrificers are like these foolish children. They will feel miserable when they become old (*Mund.* 1, 2). When a seer sees the dominant creative Reason has the same origin with the true soul, he reaches the highest unity with himself (*Mund.* 3,1). Kabandin or *Kakuda* (with a hump) Kattayana says that existence is nothing but the combination and permutations of four states (solids, liquids, gases, and spaces) in various forms due to their mutual attractions and repulsions. "When a man with a sharp sword cleaves a head in twain, he does not deprive any one of life, the sword only disjoins the combination of seven elements and vital forces (*Jīva*) by penetrating into their interconnections, *Ajita Kesakambalin* (wearer of hair garment) was a materialist (*Lokāyata*). A living body is constituted of four elements of existence. When a man dies, earth returns to the fire, air to the air and sense faculties pass into space. It is a doctrine of fools, the talk of existence after death. For all alike, fools and the wise, on the dissolution of the body, the soul is annihilated, ceasing to be

after death (*Dial. Buddha*, 2, 18). Soul is vital force. A man comes into existence like all animals in the process of reproduction. As a man drawing a sword from the scabbard can say, this is the sword and that is the scabbard, so no one can separate the soul from the body, pointing out, this is the soul and that is the body (*Dial. Buddha* 3). Intelligence is a reaction of chemical mixture of four elements at the generation of intoxicating power of liquor from a kindred mixture of its ingredients. It is therefore wise to believe rather in life than in death, to make life worth enjoying rationally and to show proper regard to persons when they are alive rather than showing honour to them after death. Chief Payāsi (*Raya Paseni* of *Jaina Upanga*) who lived shortly after Buddha's time and was a renowned materialist, compared soul in body as fire is in arani-wood (*Payasi Suttanta*). Pūrāṇa (contented) Kāśyapa had the reputation of vast learning. He held that soul was beyond good or bad actions and was not affected by them, and only an infinite mind could comprehend the infinite universes and cosmic *puruṣa*. So ultimate reality was unknowable with our limited knowledge. Maṅkari (Maṅkhalī—with bamboo-staff) Gosālā, the founder of the Ajivikas, had Vardhamāna Mahāvira as his disciple for some years. Gosālā predeceased Mahāvira by 16 years in the year when Kunika Ajātasatru waged war against Vaiśālī (*Vajjī*) republic, headed by his grandfather Chetaka. Gosālā believed in evolution through creative force (vitalism—purification through transmigration—mutation), but the fixation of species. There are 14,06,600 principal genera and species (*pañcukha yoniyo*). These species obey their immutable invariable laws. Plants however possess only the sense of touch. A creeper without touch sensation could not wind round a tree. Animalcules and worms possess two senses—touch and taste. Ants, bugs possess three senses—touch, taste and smell. Mosquitoes, scorpions, butterflies possess four senses—touch, taste, smell and sight. Vivipara have five senses. Each species (*sangati*) and each individual have their natural (*sva-bhāva*) tendency (*prakṛiti* and *pravṛitti*); they are predisposed to them. They act on their inherent impulses and instincts (*nīyati*). Even human beings cannot change their *nīyati*. They are bound by the casualty link of their inborn impulses.

Man is the highest product of evolution. His so-called free-will is also bound by the nature laws and their operational forces. As the highest expression of Nature, man has to conduct himself on that plane of superman as not to trespass on the rights of others, not to kill or hurt any living being, to be considerate to everybody, to lead a pure moral life so that his tranquility of mind may not be disturbed. Main biological principles of evolution were understood. Garura P. (2. 82) says: There are 84 laks of species of plants (udviṣa), infusoria (svedaṣa), oviparous (andaṣa) and mammalia (jarsa=uterine); of the mammalia man is the highest evolved animal. Aquatic creatures are 9 laks in number, and land creatures are 20 laks; amphibious reptiles (kurmā) are 9 laks; birds ten laks; mammals 30 laks; anthropoids (vanara) 4 laks; human tribes numerous (Viṣṇu P. Nivandadrita Vrihat Viṣṇu P.). Vertebrates are of two kinds—one with permanent teeth (ekatadanta, Manu, 5=one toothed) and with milk-teeth (ubhayatadanta, Manu 5=twice-toothed), which fall out to be replaced by permanent teeth. All living creatures are of two kinds—immoveable (sthavara like plants and sponges) and moveable (jangama. Bhāg. P. like fish, birds, insects and mammals). Of them some have only tactile sensation (sparsa-vedi—as in amoeba, starfish, hydra, paramecium through cilia, flagella and tentacles in Cambrian) developed; in addition to it in the next stage of evolution taste sensation (rasa-vedi as in Ordovician, Silurian; there are many taste buds on the body of fishes), as in fishes, developed; then olfactory sensation (gandhavedi—as in insects in Carboniferous); sound sensation (śabdavedi as among the amphibians like toads, lizards during Permian); and sight sensation (rupa-vedi as among the birds during Jurassic). Then the quadrupeds=mammals (catuṣpada) developed. After them the bipeds (dviṣad=human). Of the bipeds superman (puruṣatma) is the highest evolution (Bhagavat P.). Evolution is advanced by the adaptability of the organism to its environment, illustrated by the correlation between form and locomotion of fishes. Śaṅkara 8 (1.46,23-26) says: The river fish is bulky in the middle (wedge-shaped) because it moves with its tail and head muscles (when a fish moves forwards the waves of muscular contraction start from the anteriormost region of the body and

the role of the caudal fins is to offer resistance to the transverse movement of the fish and to exert a fraction of the propulsive thrust with the tail; the lake fish has a smaller head (in bottom fishes the head and the body are greatly compressed for crawling whereas in fishes that move slowly or remain suspended in it, the body is laterally compressed and the vertical axis is greatly lengthened; in burrowing fishes that normally live in crevices and holes body is snake like); the spring fish has a flattened body as it has not much space to move about; the fishes of the torrents are well known with flattened body on account of their crawling with the chest (in the rapid moving mountain streams the body of the fish is flattened as its chest has to lie on rocks and boulders in order to prevent to be carried away by the rapids) and a relatively reduced anterior part of the body (fishes adopted for rapid locomotion the body form a single wedge for cleaving the water).

Sanjaya, the teacher of Sariputra, the chief disciple of Gautama Buddha, was an agnostic (Ajñakika), and with his sweeping dialectic stoicism cleared away the rubbishes of metaphysical finewoven cobwebs of clever religious pretenders and mystics, and thus prepared the way and the public mind for the rational approach to social morals and ethics. And time was propitious. Videha court, the centre of religious mysticism, was swept away by the conquest by Vajjis. Kosals (Kassites), Sakyas (Bakas), Mallas, Licchavis and Sisou Nagas (Pur. Sess-naga; Sueinak of Busia; Scos of Sogdania; Haisang-nu of the Chinese = leptorrhine brachycephalic Alpines) occupied the entire fertile regions of Magadha from the Himalayas to the sea. They formed generally small republican states. They had no faith in Aryan rites. They were eclectic in their religious beliefs, and their minds were unprejudiced. Naturally with wealth and leisure they speculated on the ultimate reality of life. They were the exponents of *Upanishadic* pantheism. Pantheism gradually led to scepticism. Sanjaya was a pronounced sceptic. Many became hedonists, if not sensualists like Cārsyana, commander in chief of Prasenjit. There was seething intellectual and moral ferment in the land. The peoples lost faith in the Brahminic rites. (Ved. rita = Av. ritham = Gk. aretes = Lat. ritus), sacrifices

and asceticism. People were eager to know the truth. There was political, intellectual and moral renaissance in the country.

In this crucial time **Nathapatra Vardhamāna** was born in 570 B. C. at Kundanagara, a suburb of Vaisali of Nāya or Jnatri clan of Kasyapa Gotra. His father was a noble, Siddhārtha by name. His mother was Trisalā (Priyakarini, Videhadattā, Sreyasā), sister of Chetaka, archon of Vaisali whose daughter was married to Bimbisara of Sisunāga dynasty. Vardhamāna followed the precepts of his clan of Jina Parsa. At the age of 18 he married Yasodā of Kaundinya. He had a daughter Anojā (Anavadyā or Priyadarsana), and she was married to Yamali who became a disciple of Mahāvira, but in the end became his opponent. At the age of 30 Vardhamāna lost his parents. And with the permission of his elder brother he became a follower of Parsa sect. The principal tenets were to develop self-control, to be continent, not to kill, nor to lie or to steal; and not to drink cold water (ostensively to prevent swallowing animalcules, but actually as a hygienic measure). Parsa was born in 617 B. C. in Benares: his father was archon Asvasena and mother Vāmā. After a year Vardhamāna became the disciple of Gosālā. And as a stoic he became indifferent to his personal appearance. He stopped taking his baths. He discarded his clothings to accustom his body to bear heat and cold. After a few years he gave up the company of Gosālā as he began to doubt his predisposition theory. And Gosālā did not believe that drinking cold water or sexual intercourse is bad (Jaina Su. 2 409). At the age of 42 Vardhamāna for his heroic self-control and will-power was called Mahāvira (great hero) and Kevala (the enlightened). Mahāvira entertained and preached that though hereditary predispositions cannot be denied, man by his will, determination and heroic efforts can achieve anything, and thus make or mar his destiny. He is the architect of his own fate. He is himself the maker of his happiness or misery. Will and energy (kriyāvād) are essential for any progress. And he is responsible for every act—good, bad or criminal he commits. And his moral responsibilities are not only confined to action, but also to his speech and thoughts. If one roasts a sleeping baby, mistaking him for a pumpkin, his crime is nominal. But if one thrusts a dagger into pumpkin or roasts it out of revenge.

or animosity his enemy or enemy's son, he has committed a serious crime. Thus it is apparent that Mahāvira founded a new school of self-exertion (*purusakāra*) and self-discipline which he preached for thirty years (4 at Vaisālī, 14 at Rajagriha and Nalanda, 6 Champā, 5 in Mithilā, 1 in Brāvasti, 2 in Bhadrakā, 1 in Pava) and died in 498 B. C. a few years before Buddha in Pava among the Mallas. Mahāvira's doctrine of self-exertion and energy are quite different, if not radically opposed to the fatalistic doctrines, leading to indolence and helpless passivity, of vitalist Gośālā and his school of Ajivikās. As Mahāvira went naked after the fashion of Ajivikās, Digambara sect follows his example.

Gautama Buddha was born in 560 B. C. in Sākya (Saka) clan at Kapilāvastu. Though son of an archon, he also joined at the age of 30, leaving a promising comfortable career, a devoted wife and infant child, the restless wandering band (*Paribrajakas*) of seekers after truth. He became a Moral Idealist (*Vinaya Vādin*). He believed in social service, ministering to the sick and helpless. He preached and practised brotherhood of man and love of humanity as the greatest virtue. He advocated that one should love his fellow brethren like himself and should behave with others as he would like that others would behave towards him. When Ajātasatru asked him : "Of what use in the present world is the monastic life, and in general the practice of virtue ?" He replied, "Good conduct, mastery over oneself, food and clothing in sufficiency, but without excess, produce a rich contentment." "The disciple who has put off lust and greed, rich in wisdom, has here on earth attained deliverance from the fear of death, repose, Nirvāna and immortality. All life ends in death." "Don't think of the past, nor care for the future. Past is dead, future not yet born. Think only of your present status and with unshakable resolve, try to improve it (*Bhaddakaratha Sutta* in *Majjhima Nikaya*). Just as it is not possible for fire that was burning to exist after the exhaustion of all the materials of burning fuel, so it is not possible to represent Tathagatha (he who has obtained truth) after he has passed away on the complete exhaustion of all materials of bodily existence. Emancipation (*vimutti* = *vimukti*) is only possible through consciousness of responsibilities (*cheto*), and through knowledge (*panna*—

prajñā). But *śīla* (morality) is the foundation. Man is steeped in ignorance, about things he sees around him, for the things he sees are in fact only the vibrations (*spanda*) or transformation (*pariṇāma*) of *chitta* (mental image). Such ignorance is an obstruction and like darkness covers the knowable (*jñeya*) real truth, and is a cover of the knowledge (*jñeya varana* : *Majjhima Nikaya* 1, 487).

Nāgārjuna (one contemporaneous with Menander, another with Kanishka, and the other of 700 A. D.) in his *Mādhyamika* (middle course) or *Sūnyavādin's* doctrine expounds that existence is in a continuous transformation (*saṃvṛtī*) of phenomenon. It is in incessant flux. Nothing is permanent. *Prajñā Paramita* is a book of the *Mādhyamikas*. *Mañjuśrī Mūlakaṭpa*, a work of 2nd century A. D., is based on it. *Grubya Samaja Tantra*, a work of 3rd century is its elaboration. In it it is mentioned that *Buddhisatvas* can only be attained through gratification of senses and sensual delights, as sense perceptions are the only realities, and not through self control and deprivations. It is identified with *Prajñā Vidya*, or *Sakti*. A disciple is introduced to a *Sakti* who is pretty and agreeable to the initiated. This is *Vidyāvṛata* without which no salvation is possible as each of the 5 *Dhyani Buddhas* had their own *Saktis*. Meat and wine were permitted to these *Vajrīyanis* (whose penis became hard as thunderbolt), as these *Vidyādharas* were named. *Aśvaghoṣa*, a contemporary of Kanishka and later *Vasubandhu Aśvaga* (360 A. D.) of *Pushkaravati* in his *Yogācāra*, were *Vijñānavādins*. They held that consciousness (*vijñāna*) of experience is the only reality in life. *Mahāyāna* Buddhist philosophy developed as an interaction of *Tocharian Kusāna Kanishka* conception of universal sovereignty and humanity with Buddhism. It became syncretistic. It appealed to all classes and races of man to enhance the valuation of life and thereby to uplift humanity. While the sacred books of *Hināyāna* sect was written in Pali, *Mahāyāna* adopted Sanskrit for writing their books. *Mahāyāna* gradually veered towards unitarian faith with love for humanity as its cardinal principle. It denounced and discarded all religious rites and rituals as puerile and worthless. The ground had been well-prepared by realists (*Lokayatas*) and materialists (*Nastikas*). It made

reasoning and search for knowledge (prajñā) the true ideal of life. And the service of humanity through alleviating human misery by sympathy, kindness and curing the sick by medicines and nursing the only true religion. They not only opened hospitals for men, but even for animals. They preached that animals had souls and feeling like human beings. To kill animals for religious sacrifices was irreligion. Paramatman (supreme soul) cannot be gratified at the tortures of Jivatmans (individual souls) which are its parts. To kill innocent and faithful affectionate helpless domesticated animals for food hardens human tender sentiments which are his glory and brutalizes him, thus doing harm to its killer and eater than the victim. Ahimsa therefore became its ostensible tenet. And people adopted lacto vegetable diet. Many noble youths and maidens responded to the call of humanity. They gave up their luxurious family life and home comforts. They joined the Sangha organization to help the distressed and the sick by advice, sympathy, nursing and medicine. Sangas ordained simple living of self-control, social service, learning and sympathy, thus to promote contentment of mind. But repression of natural healthy impulses and cravings engender psychic complexes and psychoneurosis. The passions and erotic sentiments he suppresses in his conscious hours by his reasoning and will powers make a sport of him in his subconscious mind or during dreams by wanton abandon and debauchery. Dreams are the fulfilment of our repressed or unfulfilled wished for psychic hunger and longings. They are compensatory to our conscious or subconscious longings. Self-realization—complete and full gratifications of our conscious or subconscious longings — is not obtainable as long as there are psychic elements which are repressed or suppressed and which clamour for their expressions. Psychoneurosis is caused as a reaction in the endopsychic conflict between ~~man~~ of duty and dominant suppressed emotion which continually discharges its forces. Self-realization or contentment of mind therefore which requires the complete and full gratification of conscious and subconscious longings, is not obtainable as long as there are physical and psychical elements that do not get their natural expressions. Thus monks and nuns thought, found and desired each other, though they renounced family life, as real psychic and physical

comrades, complementary to each other for the realization of life as Buddha and Vidya, Siva and Sakti, Krishna and Radha. Buddhism and Brahminism approximated each other in their religious ideals and practices. And gradually Brahminism absorbed Buddhism. Buddha became the incarnation of Vishnu; Vidya became the Brahminic goddess of knowledge.

Jaina *Acaryaka* mentions that 544 years after Mahavira, that is, 48 A. D. schismatic Rohagutta of Chaulu (Chaluka-Anlukya) clan promulgated Vaissika philosophy with 9 substances, 17 qualities and 5 forms of motion. Pakilasavamin Vatsyayana in 850 A. D. wrote comments on Nyaya and Vaissika, but was criticized by the Buddhist logician Dignaga (400 A. C.). Vaissika school was set flourishing at the time of Kaniska council, mentioned by Caraka. Caraka Samhita (3, 8, 24) of uncertain date mentions Vaissika categories and Nyaya. Prasastapada wrote a Vasya on Vaissika in fifth century. According to Vaissika of Kanada or Kanabhaksha (atom-eater, a nickname) the 9 kinds of substances are: solid (prithivi), liquid (apas), light (tejas), gaseous (vayu), etherial (akasa), time (kala), space (dik), spirit (atman), mind (manas) with the attributes of colour (rupa), taste (rasa), smell (gandha), touch (sparsa), sound (sabda), gravity (gurutva), dimension (parimansa), individuality (prithakalva), combination (samyoga), separation (vibhaga) and numbers (samkhyā). Each element (dravya), though having its own particularity (vishesa), is the aggregation of numerous molecules (anu) which themselves are composed of atoms (param-anu) which are invisible and indivisible. According to Jaina Bhogovati all matter (pudgala) consists of atoms (paramanu), whether it is gross (sthula) or subtle (sukshma). According to Kanada things that exist are eternal (4, 1, 1). The qualities of an earthen vessel—colour, taste, touch, smell—vanish on its destruction. But they persist in its atoms. Different atoms may form combinations (4, 2, 4), that is, molecules. In the beginning of existence atoms were set in motion by its invisible force (5, 2, 18). Udyatkara (630 A. D.) mentions that two atoms form a binary (dyvanuka), and three or more dyvanukas form tryanukas which are visible and from which everything is produced. The Jaina logician

Umasvati of 450 A. D. who comments on Yoga Sutra (3, 22) discusses atomic linking and repulsion.

Akṣapada (eyes directed to the feet - argumentative) Gautama's Nyaya (judgment) supports and elaborates Kanāda's atomic theory; it attacks the Sunyavāda of Nāgārjuna. It is therefore of 2nd century A. D. The means of right cognition (pramāya) are perceptions (pratyakṣa), inference (anumāna), analogy (upamāna), and testimony (śabda = utterances of acknowledged authoritative persons). The objects of cognition (pramāya) are (1) Self (ātman), (2) Body (sarīram), (3) Senses (indriya), (5) Intellect (buddhi), (6) Mind (manas), (7) Impulses (pravṛtti), (8) Pain (duḥkha), (9) Wealth (artha), (10) Result (phala), (11) Rebirth (pratyabhāva) and (12) Release (apavarga) through discussion (vāda), reasoning (tarka), examples (dṛṣṭānta), removing doubts (samsāya) of the theory (siddhānta) and knowing the motive (prayojana), so that reality (nirvāya) may be found out.

Saṁkhya (numbers) is ascribed to Pāncasikha Vāsaganya as disciple of Asuri, a disciple Kapila. Pāncasikha's disciple was Sulabha who contemporaneous with Janaka Dharmadhyaṃja (5th century B. C. M.Bh. 12, 321) preached a doctrine of 60 principles (Sasthi Tantra). But the oldest existing Saṁkhya Kārikā of Iśvara Kṛṣṇa of 3rd century A. D. enumerates 25 principles. Caraka, the physician of Kanishka (78 A. D.), no doubt describes Saṁkhya doctrine; but the compilation of Caraka Saṁhita is of uncertain age.

But Balarāma mentions that Sastitantra was the work of Vāsaganya, and Vyasa on his comment of Yogasutra (4, 18) cites a passage which is attributed by Vācaspati Miśra on his Brahma Sutra (2, 1, 3) to Vāsaganya. In his 4 citations Vāsaganya (Yoga Sutra Bhāṣya 3, 53) opposes the atomic theory of Vaiśeṣikas. Saṁkhya Sutra (5, 32) Vyāpti, the natural (hereditary) intellect developed by environmental stimuli, is the same as in Nyāya. Iśvarakṛṣṇa seems to be about 3 century A. D. Saṁkhyakārikā was taken by Paramārtha in China in 546 and translated it between 557-569. It is ascribed to Vinḍhyavasa, perhaps a name of Iśvarakṛṣṇa, in the Chinese tradition, and Vasubandhu who lived about 300 A. D. wrote a work refuting the doctrines of the Kārikā. Saṁkhya is evolu-

tionary and atheistic. Unmanifest (avayakta) matter has evolved into multifarious forms. Consciousness is nothing but refined manifestations of evolved transformed matter as intoxication (alcohol) is formed in certain states of molasses. Twenty five Principles of Sāṃkya are the following:—(1) Prakṛiti or Pradhāna, the primal matter out of which the whole universe has evolved; (2) Maḥat (the great) is the consciousness (buddhi) which has evolved out of Prakṛiti; (3) Ahankāra is the ego, developed out of consciousness; (4) 5 Tanmātras are the five co-ordinating centres (cortical lobes) for co-ordinating consciousness of perceptions; (5) 5 Māhābhūtas as five aspects of matter as solid, liquid, luminous, gaseous and ether; (6) 5 Jñānedriyaṇi = 5 sense organs; (7) 5 Karmānendriyas as hands, feet, voice, organs of excretion as anus and generation; (8) Manas, the co-ordinating organ. Matter is in 3 Guṇas, as illumination (sattva) in fire; motion (rajas) as in our activities; in static condition (tama) as in earth.

Purva Mīmāṃsā of Jaimini is the earliest of the orthodox six philosophies. It is based on the Brahmana rites. It is a theological treatise. It says Sabda (Logos) is eternal. And the Vedas and Mantras are parts of that Sabda. It is of 2nd century A.D. Its first commentator was Upavarṣa of 4th century A.D. who discussed against Sunyavāda and Vijnānavāda. The next commentator is Adityādeva of about 400 A. D. who in order to evade Jaina persecution adopted the name of Sabara svāmin as he associated with Sabara. Kumarila Bhaṭṭa wrote on Sabarabhāṣya. He sharply attacked the Jaina omniscient being, for which he was severely criticised by Vidyānanda who lived before 838 A. D. Mandana Miśra, a brother-in-law of Kumarila, wrote Vidhiviveka. Mandana being defeated by Śaṅkara became his disciple under the name of Sureśvara of Sringeri Mat. The Mīmāṃsā doctrine of ever-lasting Sabda (1, 1, 8) is refuted by Nyāya (2, 2, 23) on the ground that efforts are to be made to understand the meaning of words. Mīmāṃsā's view is because the deaf do not hear that does not mean sounds do not exist. Nāgārjuna held that dream consciousness has no real sensory foundation; vague floating ideas agitate the mind without any real corresponding object. Sabara svāmi answers that in dream-state mind is weak and cannot act effectively; ideas

cannot be simply mental agitation without concrete external reality.

Yoga Sutra is ascribed to Pātanjali. It discusses the atomic theory (1, 40), and attacks Vijñānavādin whose exponents were Asaṅga and Vasubandhu who lived about 300 A. D. Buddhist Sūtrāntika doctrine is that time consists of moments (khaṇas 3, 58). It is also accepted in the Vaiśeṣika Prāsaṅgikābhāṣya. But its Sphota (3, 17) theory is identical with that of Pātanjali's Mahābhāṣya, in which the sound waves (dhvani) of a speech is conveyed in aerial waves to the ear-drum; but they remain indistinct, meaningless sound impressions (nāda), as long as word-consciousness is not formed (in the brain); word consciousness is a form of general consciousness (buddhi). According to Nyāya God gives the word-image (Iśvarecchārupaḥ). Through Yoga added a theistic principle Iśvara (26) to a atheistic Sāṃkhya's 25 principles, yet it held many things with Buddhism in common. It believed that life with consciousness evolved out of matter, as intoxicating principle (alcohol) is generated in molasses (madusaktivat caitanyam). Space (dik) is a kind of matter. It wanted like the Buddhists mental disassociation from pleasure and pain sensations, the bondage of Samskāra (psychical predispositions), and not the serene tranquility of mind. Its *saṃra* corresponds to Buddhist Ahimsā, Maitrī and Karuṇā. The will to achieve this state of mind by moral excellence is enjoined in both. But Yoga Sūtras teach that this can be obtained by concentration of mind (dhāraṇa), by control of conscious or subconscious impulses which may be facilitated and induced by deep-breathing (prāṇāyāma) and certain kinds of postures (āsana), conducing to physical and mental relaxation. In the later Yoga reflex muscle control is also taught; concentration of mind is attained by devotion to Iśvara (1, 2, 3) who is not affected by past or present Karma or their future results (1, 24), in whom the germ of the omniscient is at its greatest excellence (1, 25). *Parameśa* is the underlying energy which sets the matter into motion, thus advancing its evolutionary progress and developments. The Yoga Sūtra thinks that discipline (yama), physical and mental, is essential. *Yamas* are (1) Ahimsā—doing no injury or harm to any living creature; (2) Satya—

truthfulness ; (8) Asteya-honesty ; (4) Brahmacharya-sexual control ; (5) Aparigraha-not to receive gifts, that is, economic freedom. The regular routines (niyamas) are : (1) Tapas-exertion ; (2) Svādhyaya-regular studies ; (3) Sauca-purity, both internal and external, physical and mental ; excretory organs shall be made to function properly, constipation and cold are to be avoided. (4) Isvara-pranidhana-to think of god ; (6) Santosa-contentment ; (8) Pratipakṣa bhāvanā-to counteract a bad thought with a good one ; (7) Maitri-friendly feeling and relation with all ; (8) Karuṇa-sympathy towards all ; (9) Mudita-to promote the happiness of others (10) Upekṣā-indifference to the praise and blame of others. These practices (abhyāsa) are to be systematically carried out with devotion (śraddhā), intelligence (prajña), determination (vīrya). It is said that Sarvāṅgāsana accelerates the circulation of the blood of the head, thus prevents the premature gray hairs, it also stimulates thyroid glandular activation. In this posture one lifts up the feet and the thorax on the shoulder, neck and head and the upper arms which lie flat on a soft bed. The Matsyāsana strengthens the backbone, nervous system. In the fish pose one lies flat on the back and raises the vertebrae in elliptic curve, supporting the body weight on the buttock and the head. Śīrṣhāsana stimulates general circulation, and tones up the general nervous system and relieves constipation. On a soft bed near a wall one lifts up the entire body, resting its weight and the balance on the head and the spread out fore-arms. Halāsana is said to be beneficial in constipation. It reduces abdominal fat. In this plow pose one lies on the back, resting his head over his arms. He lifts up his feet and legs and the thorax as far as possible. Bhujangāsana is beneficial for the same purpose. In the cobra pose one lies on his head face downwards and lifts up his head and thorax on the forearms. In Uddiyana one stands up, bends and rests his forearms on his thighs and contracts many abdominal muscles. It improves digestion and reduces abdominal fat. Rectal enema (vasti) to flush out the colon with water, attended with abdominal suction, is recommended in obstinate constipation.

Brahma Sutra of Bādarāyana is based on Upanishadic speculations. Bādarāyana refutes Vaiśeṣika atomic theory (2, 2, 11). According to Sankara (2, 2, 28) it criticises the Sunyavāda and Vijnāna vāda of Ānanda. Aryadeva, a contemporary of Nāgārjuna, refers to zodiacal signs and weekdays, not known before. So Brahma Sutra cannot be earlier than the middle of second century. Brahma Sutra expounds pantheistic monism with underlying theistic currents. This is no new doctrine. "As the spider ejects and retracts (the threads within its body), the earth produces plants, as from the embryo develop the organs and hair, so from the eternal Brahman the universe has evolved (*Mund. Up.* 1, 1, 7)." "Agni (Aras) is his head; his eyes are the sun and the moon; space is his ears; his voice is the revealed Vedas; air is his breath; his heart is the universe; from his feet the earth; he is the inmost self in all elements (*Mund. Up.* 2, 1, 4)". Even in R̥gveda we find, "Puruṣa is all existence, what has been and what will be—*Puruṣa evadom sarvām, yad bahutam yaś ca bhavyam* : X, 90, 2); "Only one Reality exists; poets call it by various names; *ekam sad,—viprā bahudā vadanti* 1, 164, 49)." Sankara (785-820), a student of Gaṇḍa Bhagavatpada, a disciple of Gauṇapada who wrote *Mandukā Karikā*, by his vast learning and sincere conviction, gave Brahma Sutra a pure monistic interpretation. He established monasteries especially of Śringeri where he placed his disciple Mandana Miśra, brother-in-law of Kumarila Bhaṭṭa, whom he converted into his doctrine from Mīmāṃsā school, under the name of Sureśvara. There are many anecdotes associated with Sankara's life. But the most popular is his encounter with Bhārati, wife of Mandan. When Bhārati saw that her husband Mandan was being worsted in his arguments, with her feminine ready wit and deep psychological insight said: "Your talk about happiness and joy (*ānandam*) in identifying one self (*jīvatman*) with the supreme self (*Param Ātman*) is a dreamer's utopia without any adequate sensory stimulus and its realization. It is simply auto-hypnotism. You are deluding yourself and deluding others with a false mirage of hope. No doubt every organic being instinctively avoids pains and seeks pleasure. But pleasure is associated with the harmonious

functioning and exercise of all organs, adequate sense stimulations and their reciprocal responses. Though it has nothing with monism you say that all sense impressions have to be stifled to sensitize the mind for its identification with the Atman. Basic instincts cannot be suppressed without crippling body and mind. That will create a perpetual endo-psychic friction between physical impulses and a suicidal will. Love is so basic that even animals impelled by its sentiments endangers their lives for the perpetuation of the race. Love is so strong that even resolute men forget their sense of duty for its gratification. It is such a creative force that individual love is gradually transformed into universal love. It is the key to self-realization. Have you got experience of it? If not your talk of spiritual *ānandam* is an illusion that has deluded you. Before you have experienced the joys and delights of love, your conception of *ānandam* cannot carry any conviction.

Before I loved my husband, I understood not the meanings of life. I felt vague unrests. Life I felt was incomplete. But as in his love I lost myself, life revealed itself in its myriads of light and shades, full of charms, like an enchanting dream. It was a self revelation of enthralling beauty. You believe that the universe is an illusion. Why not then take as your companion its most alluring form (*māyavini māya*) in the shape of a pretty woman, and eternity will appear to you as a fleeting moment; and what a rapturous moment of hedonic festivity. Before you know it, your talk of very lasting metaphysical *ānandam* is a dreamer's tantalizing hallucination." Sankara felt that with all his pedantry and logic he could not answer her queries. He has devoted all his energies to his studies. He has been a sincere continent celibate. He has regarded the cravings of the flesh with suspicion. He knew nothing of the pleasures of instinctive expressions. He has been taught to suppress them as a means of self-realization. Now he felt his life was incomplete without those experiences. How could he know that psychic joy of an ideal is better than the pleasurable sensation of sensual gratifications which the entire animal world craves and which is the source of life and its perpetuation. Sankara begged from her one and half a month's leave to answer her question from personal experience. Sankara

was born of Nambudri parents at Kaladi, six miles from Alwaye, only son of Sivaguru as father and Aryambā as mother. Father died when Sankara was quite young. Nambhudri is a privileged class. Younger sons of Nambhudris can consort with Nayar girls without any obligation on their part. And Nayar girls took pride in having Nambhudris as their lover husbands. And Nayar homes were always kept open day and night for the Nambhudri guest lovers. And Nambhudris have not to support their Nayar wives or their children. That duty falls on the Nayar women and their brothers. This creates consequently a number of unmarried women among the Nambhudris. Though Cochin princes are allowed to marry Nambhudri girls, that does not absorb the surplus. So Sankara had plenty of opportunities to secure his amorous curiosity and experience without undergoing any risk. When Sankara's mother died, his clan did not permit him to perform her last rites, thinking him perhaps illegitimate as his father was very old and despaired of having any offspring, and mother claimed she got him by the grace of Siva; but when he insisted on it, his clansmen did not join him. But if Nambhudri or Nayar girls were found guilty of misbehaving with lower classes, they were ostracized and sold as slaves to Moors. They preferred joining the Bedys, or swelled the rank of the Syrian Christians. After the allotted time Sankara returned to Mandan's house, possibly on the Narmada, to answer Bhārati's questions out of his own personal experience. Sankara said: "The gratification of an instinct and the expression of its sensory stimulation give only a temporary pleasure sensation as a relief in the process of unloading a physical and nervous tension. And excessive sensory stimulation is likely to be devitalizing and enervating. One could not experience as for an example sex pleasure inspite of strong will all the moments of life. But contentment of mind when all the instinctive impulses, sentiments, inclinations and desires are sublimated, known as well as an ideal and they strive and find in harmonious concord their realization, that contentment is uninterrupted. That is not dependent on external stimuli or factors. That is within. The search of pleasure through the fulfilment of one dominant instinct means the suppression, at least subconscious, of other

instincts, which necessarily create subconscious complexes, and thereby mental uneasiness and discontentment. Neither the successive or separate fulfilments of all of our instincts, complexes and inclinations can bring contentment which is not the summation of all pleasures. The sensations of sensory organs have no commulative effect". "But our instincts, complexes behaviors are determined and fashioned by Karmas of our past births (heredity) and their counteractions by environmental factors. We can partly inhibit and repress the expressions of organized sentiments, racial habits—the inflorescence of deeper impulses. But for organic impulses developed naturally for self-preservation and reproduction we have no control. In their harmonious normal fulfilment, there is self-realization and not in their abnormal repressions. Our ego-consciousness (ahamkāra) is based on experiences of life, both pleasures and pains. It is like a river which is permanent, continuous in its flow, yet constituted of separate particles of water like diverse sense impressions. Our consciousness, intelligence and idealism are primarily based on the sensory experiences. Without them we shall be like wood and stone and not superman." Sankara said: "No doubt there is a natural craving for the satisfaction of animal propensities. But its gratification gives only temporary relief, which through the veil of Māyā makes one believe that it is the main object of life." The domineering personality of Sankara convinced Mandan of the futility of ceremonial rites. He followed Sankara, and became the head of Sringeri monastery as Suresvara. Bhārati accompanied her husband. For her learning Śārada sanctuary was established in Sringeri Mat after her name by Sankara.

Karma and Māyā doctrines are the great contributions of Hindu Philosophy with the pantheistic monism as its crowning glory. Karma is heredity from animal ancestry and its modifications through environmental influences, and even through deeds, speech and thoughts. Generally antisocial animal propensities and predispositions are inhibited, and useful emotions, sentiments, complexes are broadened and deepened along the nerve channels in the first few years of infancy from parental association and environmental factors. Heredity is no

doubt a dominant factor; but environment is no less potent in moulding behavior and conduct. We inherit certain predispositions; and they are susceptible to be modified by our environment and training. The co-ordinated organized sentiments create personality. Repressed predisposed impulses form the subconscious complex. We cannot alter the effects of heredity and environment of childhood. So our behaviour is determined. It is the Karma fatalism (*adristha*) of the Hindus, determinism of modern psychology. *Māyā* is no delusion, but phenomenon created by our mental projection, our incapacity to see things except through the film of time-space which is our innate limitation—our *abidyā*—bound up with our mode of perceptions. Appearance is deceptive. But behind, as if obscured by a mist, lies the truth. All sensation is relative and inter-dependent. We can see and hear only within the limited range of light and sound wave lengths. The lotus petals look red, for the petals absorb all other lights except red which is splashed back into our eyes. But if the lotus petals are illuminated by blue light which is entirely absorbed, the lotus petals look colourless or black. If a man who is color blind to red looks at the petals of the lotus, lotus petals will look colourless. So the redness of the lotus depends on three factors—redness of the lotus, redness of the lights with which it is lighted and the capacity of seeing redness on the part of the participant. In normal eyes the longest waves of light produce the color impression of various shades of red and orange; the shortest produce the shades of indigo, violet and blue; while those of the intermediate length of yellow and green. The selective molecular scattering of light causes the blueness of the sky, sea, water and ice. The short waves of light that compose the blue end of the spectrum are easily turned aside than the longer red waves just as ripples are turned aside by a rock over which longer waves heave themselves, just as before a high speed moving motor car dusts of the road are scattered on both sides. Thus separation of colors take place, but not destruction. So the light of the sun at sunrise or sunset would incline towards yellow, because the longer traverse through the air would cast aside the blue rays to one

side, making the sky and sea blue. But in an aeroplane flight at the altitude of 8500 meters (5.27 miles) the sky looks blue; at 11000 (6.82 miles), the sky appears dark-blue; at 15000 (8.06), dark violet; at 21000 (13.02), black violet; at 22000 (13.64), black grey. Grass is green. But is grass green at night? What happens to the green colouring when sunlight disappears? A book that weighs 5 kilos at Calcutta will weigh slightly more at the Polar regions and slightly less than at the equator. A man weighing 50 kilos on the earth would weigh 17 kilos on the Venus or Mercury, for the weight will vary according to the speed of the planet. An apple falls to the ground due to the gravitation of the earth and its centrifugal forces. Nothing is absolute. Everything is relative. This is the Māya of the Vedāntā, borrowed from the Sunya doctrine of Nāgarjuna and his Mādhyamika school. Life and experiences are in continuous flux, like a stream, made up of new currents of materials and thoughts. Even the molecules of our hard bony structure are continuously replaced by new cells. Only the continuity of consciousness, organized self of sentiments, in a normal nervous system, remains. We crave in religion and in heaven, and realize in dreams what we wish but cannot get in life. Religion and dreams are the fulfilment of our psychic hunger. They are compensatory to our conscious and subconscious longings. They are the expressions of our repressed unrealized wishes. The Islamis of Arabian desert conceive of heaven as a delightful garden of large fruitful shady trees on the bank of a stream or large lake, filled with youthful smiling maidens as a contrast to the early fading of rude, coarse Bedwin dames. The Bakimo paradise is a tropical country. The Hindus distracted by torrid sun, thunderstorms and desert winds, disturbed and unhappy by diverse foreign conquests and aggressions, joint family and numerous progeny, think of a heaven of Himalayan tranquility where one spends his solitude without any attachment in perpetual contentment and bliss.

Dream images are not the impressions of our wandering souls during sleep. The dream stuffs arise from the pressure of our internal organs, muscular tensions, the disturbances of circulation or digestions, external stimuli or mental agitations. Awkward positions, extension

of the limbs or difficult breathing due to gastric troubles may give rise to dream fancies and sensations of flying, rapid ascending. Retinal stimuli may originate illusional impressions. Indigestion is a frequent cause of nightmare. Sleep is favourable to emotional conception as imageries which are built upon by sensory activities when motor functions are inhibited. There fore sensory excitations entering into motor channels, finding resistance for their activation, are split up, scattered and transmitted into the brain as a wave of emotional fantasies. Conceptual forms develop into images, motion and idea. Our ideas are not only thought, but also felt and experienced. So some dreams mockingly elude our memory, as they left no images which could be recollected. There are other dreams whose memories remain fragmentary or vivid. There may be a succession of images. Dream is the fulfilment often of our conscious or subconscious wishful longings. Thus when our bladder is full we dream of urination. When there is seminal pressure we have erotic dreams, even in intimate union with one who has repulsed us. So internal or external stimuli and irritations are transformed into relaxations, gratifying our longings, felt in the deep strata of our subconscious mind. That solid matter like coal (*tamas*) may easily be transformed into motion (the turning of the wheels of locomotive engines) or electric energy (*teja*) or as electric light (*satya*) is a modern common knowledge. But at the time of Sāṅkhya doctrine it was a daring speculation. The conception of atomic linking and repulsion of *Umivati* might have originated from positions (*silk*) and negative (*amber, porcelain*) of substances. Of course the theory that atom itself is composed of positive charged nuclear proton round which like planetary orbs rotate the negative charged electrons is modern. In *Samraṅgana Sūtradhara* by Rājā Bhoj Deva (published in Trivandrum Skt series), 31st chapter contains descriptions of various kinds of machines as elephant machine, wooden *Vimān* machine flying in the air, wooden bird machine flying in the sky, Door keeper machine, soldier machine. "Having made a large bird of light wood with strong well jointed body, the machine containing mercury is to be placed on a receptacle containing fire (95). (The figure of) a man) sitting on it flies far up in the sky with the help of the wind,

produced by the two wings set in motion by the force of heated mercury (96). The advantage of mercury over steam is that whereas the steam is lost in working an engine, mercury is not lost, but vapour condensed by cooling and heating works the engine again. There is hardly any danger of mercury poisoning. A very sensitive instrument has been developed which will detect the slightest presence of mercury vapour in the flue gases. Between 490-470 B. C. Alpine Dorian Sparta and Aryan Ionian and Achaean Athens fought together against their common invading Persa army of Darius and Xerxes. After their decisive victory Sparta demobilized her army, and suffered the consequent economic disturbance, to ameliorate which it turned to agriculture. Athens turned her victorious navy into merchant fleet of the Mediterranean regions and thereby not only acquired wealth, but also it became the meeting place of many races and thoughts. An opulent thinking middle class rose which began to question ancient cults and traditions. Travelling debaters of wisdom (sophists) rose, who enjoying the hospitality of the people like Paribrajakas of the Upanishadic period, discussed and diffused every problem of religion, morality and politics. Many of them like Gorgias, Hippias, Protagoras and Prodicus were clever sceptics and enjoyed the fun of ridiculing existing institutions. But they dreamed of creating new, better and ideal world where men would be free and intelligent, virtue and wisdom being identical. Luxury, selfishness and slavery were however corroding the stern simplicity of the people. Out of 400,000 inhabitants of Athens 250,000 were slaves. The theory of the transmigration of souls (metempsychosis) is usually associated with the ancient Egyptians who are said to have practised embalming to prevent or delay reincarnation. Greece apparently borrowed the doctrine from Egypt. Orphic religion which held it first appeared in Thrace. Orpheus, its legendary founder, is said to have taught that 'soul and body are united by a compact unequally binding on either; the soul, divine and immortal, aspires to freedom, while the body holds it in fetters as a prisoner. Death dissolves this compact but only to re-imprison the liberated soul after a short time; for the wheel of birth revolves inexorably. Thus the soul continues its journey, alternating between a

separate unrestrained existence and fresh reincarnation, round the wide circle of necessity, as the companion of many bodies and animals. To these unfortunate prisoners Orpheus proclaims the message of liberation, that they stand in need of the grace of redeeming gods and of Dionysus in particular, and calls them to turn to god by ascetic piety and self-purification: the purer their lives, the higher will be their reincarnation, until the soul has completed the spiral ascent of destiny to live for ever as god from whom it comes.' Pherecydes popularized it. Pythagoras, his pupil, became its philosophic exponent and brought the Orphic doctrine from northeastern Hellas to Magna Grecia. In Plato's Republic, possibly the doctrine of Socrates who was accused of being a follower of Pythagoras, Br, the son of Armenius, returned to life on twelfth day after death and recounted the secrets of the other world. Socrates in Phaedo is not afraid of death so that he can get the experience of the after-death. Pythagoras, the son of Mnearchus, was a disciple of Pherecydes. He was a most assiduous enquirer. He was driven away from his native place by the tyranny of Polyxates. In 529 B.C. he settled in the Dorian colony of Croton in S. Italy. There Pythagoras established a community of brotherhood, where there was no personal property; the land and its products belonged to the community. Men and women ate from the common table and the women were common to all. The diet was vegetarian. To enable the soul to escape from the wheel of births some Orphic rites and abstinences were performed. Cylon sacked and burned the Pythagorean meeting places in 510 B.C. And in Croton 50 or 60 Pythagoreans were slain. Pythagoras migrated to Sicily where he established his Brotherhood on a firmer basis. Plato visited one of their communal establishments to study their constitution personally. Pythagoreans believed the universe to be spherical in shape, but finite in size. Outside it is infinite void which enables the universe to breathe as it were. At the centre is the central fire—the hearth of the universe, wherein is situated the governing principle, the force which directs the movement and activity of the universe. Round the universal hearth revolve the counter-earth which is not visible; the earth, then the moon,

the sun, then the five planets, and the last of all, the sphere of fixed stars.

Socrates (469-399 B. C.) gathered round him a number of rich youngmen who were imbued with his spirit of revolt against mobocracy which went in the name of democracy and in which conventional religion and shoe-makers, tanners, petty traders who were ignorant and stupid shaped the policy of Athens. But while Socrates taught, they believed in translating their thoughts into action. Such a dynamic force no state can suppress which demands obedience of laws, made to safeguard the vested interests of the supporters of the government. They believed that the government should be in the hands of the thinkers and the wisest who are the best persons to lead. Plato wanted to reform society (Republic) on eugenic base ; he advocated an ideal state where the intellectuals would lead advancing civilization. Alcibiades, nephew of Pericles, *the fair son of Cleinias*, and the beloved of Socrates, demanded state socialism. Aristippus demanded the abolition of slavery as it degrades the character of the master as well as the slaves. Anytus, son of the Democratic leader, turns against the state that distrusts the intellectuals and respects only the stupid mob rule more than the guidance of the wise. Khatti and Cimmerian (Amazons of Crimea) women who moved freely, were educated in their temples, and were free-lance thinkers, unlike the ignorant and secluded Athenian woman, adopted the lucrative hetaræ profession, attracted by the opulence, intellectual ferments and racial concourse of Athens. Thus they formed the female aristocracy and drew like magnet the wealthy intellectual leaders of the society. Even their residence became the rendezvous of philosophic and artistic discussions, and formed the nuclei of Neosophism. Home thus of many Athenian thinkers became unwelcome and unpleasant. Xanthippe thought that her husband Socrates was a good-for-nothing talking shop which brought to her and her children more notoriety than material comforts. At this time well-disciplined Sparta fell upon luxurious and lazy Athens in order to plunder it (Peloponnesian War : 480-400). Critias, leader of the intellectual aristocratic oligarchic party, demanded the abolition of the sham democratic government as it was proving inefficient in conducting even the defensive war.

Many of the prominent intellectual aristocratic leaders were exiled. But Sparta as peace condition demanded the recall of these exiles. After their return, these intellectual aristocrats under the leadership of Critias, a favourite of Socrates, and Charmides an uncle of Plato, both followers of Socrates, established the Oligarchy of 30 tyrants; but the revolution was suppressed after 8 months; and Critias and Charmides met their death on the battlefield. Critias had confiscated during his short aristocratic regime the property of many democrats and executed some of their prominent members. Critias stirred up Thesalian revolt. Critias declared that the gods are the invention of clever men of olden times. Alcibiades mutilated the sexual organ of Hermes just before the eve of the naval expedition against Syracuse which he himself sponsored, and made a mockery of the sacred Eleusian Mysteries. But when he was recalled, he joined the Spartan forces and practically brought the ruin of Athens. But again when he was made a joint admiral with Thrasybulus, against his advice, he made an incompetent fellow reveler as his assistant who by a stupid engagement with the Spartan fleet lost practically all the Athenian ships. And when Alcibiades met his death at the hands of Persian assassins at the instigation of Sparta, and when Anytus and Thrasybulus became the victorious leaders of the Democratic Government by the suppression of the Oligarchy, the fate of Socrates was settled. And in 399 he was tried, though he did not participate personally in the revolution. His young followers, particularly his neighbor rich Crito, came to the prison, bribed the jailers and offered his easy escape. But he declined the offer, and died cheerfully at the age of 70 by drinking hemlock.

Aristotle was a Caspian Macedonian. He was born at Stagira in 384 B.C. His father was the physician of Amyntas, grandfather of Alexander. Aristotle studied under Plato possibly 20 years, but not less than 8. Alexander's father Philip completed his conquest of Thrace in 336 and thus secured its valuable gold mines. In 338 Philip defeated the Athenians and brought entire Greece under his imperial control. He not only conscripted Athenians into his army, but secured also the silver mines of Laurium, the source of wealth of Athenians. When Alexander was 13, Philip appointed Aristotle as his teacher.

But after two years Alexander left his studies, mounted the throne and aspired to ride the world. Aristotle established his famous Lyceum at Athens in 334 B. C. at the age of 53. Though Athenians were hostile to Aristotle for his close connection with the Macedonian army governors at Athens and for his advocacy of Macedonian imperial unity, but being financed and supported by Alexander, Lyceum became a flourishing institution. It is said that Alexander contributed for Aristotle's library, biological museum and researches about 800 talents. But when Aristotle's nephew Calisthenes was put to death by Alexander for his refusing to acknowledge Alexander as a representative of god, Aristotle protested. However Alexander reminded his former teacher that it was even within his power to crush not only the freedom but even to put to death hostile philosophers. But under Macedonian patronage Aristotle had the difficult task even during his controversy with Alexander of defending his imperialistic tyranny against Athenian democracy. Suddenly news came that Alexander had died in 320. Athenians under the leadership of Demosthenes in hilarious joy of patriotism revolted against Macedonian imperialism, overcame the occupying army, and declared its independence. Eurymedon, the chief priest, brought a charge against Aristotle for teaching youths against national cults. Aristotle finding the situation difficult, fled, arrived at Chalcis, fell ill and died in 322.

Zarathustra (569-522 B. C.) incited Vistaspa, father of Darius, to overthrow the usurper Gaumata and the Magoi who supported him (Yasna 53, 5, 8-9). After the occupation of Persia and Merv by the Arabs, many Sassanian princes, headed by Firuz, migrated to Changam in China about 600 A. D. and there they built Zoroastrian temples where they trace era of their religion from 569 B. C. Zoroaster preached that a contented married man with a large number of children and a well cultivated and irrigated land and big herd of cattle is the performer of best sacrifices. This fostered harmonious family life, a hardy race and industrial pursuits (*Vend.* 8, 1, 8, 17). Prostitutes are more poisonous than gliding snakes and dangerous than howling wolves (*Vend.* 7, 61, 5.). Prostitution (*Vend.* 18, 61), abortion (*Vd.* 15, 9) and sodomy (*Vd.* 1, 12) were denounced. Perhaps Zarathustra was a Parsa or of mixed races, and he

preached frugality and industry as conducive to human happiness than the propitiation of Aryan gods (Devas) and the magic sorceries of other races. It was a national protest against futile and puerile practices. And contracts had to be honoured (Vd. 4, 1). Until the reign of Xerxes, the people were very moderate in their food and drink, eating only one meal a day and drinking usually water. But after the conquest of Darius with accrued wealth from vast Achaemenian possessions, the peoples, particularly, the aristocrats became ease-loving. Eating, drinking and venery became the chief occupations of the nobles and generals. Entire animals were roasted, stuffed with rare meats, spices and rich sauces. Drunkenness affected every class. King's and noble's harems contained more than 365 pretty youthful concubines, for it became the custom with the aristocracy that no single woman should share the royal or the noble's bed more than once. And the selected woman had to take her bath daily in water of aromatic herbs and her body was perfumed for months before she could be sent to her lord's connubial chamber. And a regular register was kept as to her lineage, age, menstrual cycle and the day and the hour of her sexual congress. And the harem was in charge of a crowd of corrupt and corrupting eunuchs. And even then the Persians learnt from the Greeks the passions for boys. Xerxes dividing his time among his mistresses became a fine example of high living sensuality for his nobles. After 20 years of sexual intrigues and administrative negligence Xerxes was murdered by a courtier. There were dangerous political intrigues in the harem where clever women fostered claims in intrigues with eunuchs and nobles for their sons for the throne and high offices. Persian generals took their concubines with them in war. No wonder Xerxes was defeated at Salamis. When Darius was defeated at Issus he fled cowardly leaving behind his treasury, mother, wife, daughters for the spoliation by the conqueror.

Confucius (Kung Futsze = Philosopher. Kung : 550-478 B. C.) was born in his father's old age (80). His father Shuhliang Hsi was commander of Tsaw, and he died when the child was only 4 years old, leaving the family in economic difficulties. Confucius ascribed to the poverty during his youth his knowledge of many arts. Confucius is shown in *Peikin* (Museum of

Inscriptions) at Singamfu with a dolichocephalic head but with elongated broad face, fine long arched brows, a long nose large ears, all Caspian traits (14 E. B.) He was of Tang (Tunges) descent. Confucius taught practical morality on which individual family and state welfare and harmony could be based. His idealism is tinged with utility, and entirely devoid of religious mysticism. Confucius says: While you are not able to serve men, how can you serve their spirits. While you don't know life, how can you know about death. When Kekang asked Confucius, "What do you say to killing the unprincipled for the good of the principled", Confucius answered: In carrying on your government why should you use killing at all? Let your desires be for what is good, and people will be good. Centralization of wealth is dangerous. With prevalence of wide education, there will be no distinction of classes. Employ the upright, put aside the crooked. Thereby the crooked can be made upright. Manicinus, a follower of Confucius, denounced war as a crime against humanity. Those who say, I am skilful in marshalling troops, I am skilful at conducting a battle, they are great criminals. There never has been a good war. The people are the most important element in the nation, the sovereign the lightest; when the government is not well managed under him, the people ought to dethrone him. Hentze believed Nature (Jen) supplied Raw Materials; Nurture (Li) converts them into finished products. Jen is the predisposition, individual, family and social heredity, which has both good and evil propensities. By nurture, evil and antisocial inclinations are to be canalized into moral and social streams of activities.

Thus almost contemporaneously there was intellectual revolt in Greece, mainly political; in Iran, economic; in China, moral; in Eastern India mainly spiritual. But the public took keen interest. They erected debating halls almost in every town for wandering teachers (*Paribrajakas*). Chiefs, rulers, archons and rich bankers vied with each other to make sumptuous presents to the best debaters. Even pretty maidens of aristocratic families declared in the assembly halls that they would marry the victors of the intellectual contests. It was the age of free-thinking, the most glorious period of

India's cultural history. It was a time of progressive republican ones, economic prosperity and fusion of races. And the joy of living became the dominant ideal and passion of the masses. This school of hedonism was led by Dirgha Charāyana, war minister of Prasenjit of Kosala and his son. He believed that pleasure is the basis and aim of all actions. And individual happiness is based on social contentment and harmonious relationship. Utilitarians led by Kautilya Vishnugupta Chanakya believed that social contentment is dependent on orderly stable government, regulating and conditioning general prosperity of the people. Wealth (artha) is the medium by which all desires (Kāma) can be procured and fulfilled. So the state must foster and create wealthy citizens, amply secure for their means of contentment and happiness, thus also stabilizing the state and royalty. Mullanaga Vatsāyana in 4th century A. D. preached that senses impressions are the only realities of life. So all kinds of sensory delights shall be the aim of life (Sensualists). Vision (Rupa) is focussed on the biconvex lens of the eyes whose retina is the peripheral and organ. Only the rays of wave lengths varying from red 7280 Angstrom unit (one being a ten-millionth of a millimeter) to violet 3970 Åu. make impressions on the retina. Beyond the red end are the infra-red or heat rays of greater wave lengths and they make only sensation of heat. Shorter waves beyond the violet are called ultra-violet rays, and for the chemical changes they bring about they are known as Actinic Rays. There may be Myopia (short sight) due to congenital or acquired abnormal elongation of the eyeball or great curvature of the cornea or lens due to malnutrition. It may be corrected by the use of divergent concave glasses. If the eyeball is abnormally short in its antero-posterior diameter, parallel rays are focussed at a point behind the retina, causing hypermetropia (long-sight), which may be corrected by the use of convergent convex glasses. There may be gradual loss of accommodation (presbyopia = old sight) due to the elasticity of the lens or hardening of lens nucleus or weakening of the ciliary muscles, the distance of the near point becoming greater with the age. The rays of light may be dispersed into their component colours and a coloured margin appears round the image (chromatic aber-

ration). Impulses from retina are projected upon the visuo-sensory area in which there is recognition of the shape and colour of the pictures; in the adjacent psychic area sensations are sorted out and correlated with the previous memory pictures. Each visuo-sensory area (cortical retina) in the occipital lobe corresponds with the opposite half of the retina. If the psychic area of the occipital lobe is damaged, though the retina may be in normal working condition, one can see, but will not recognize the object. Red or orange, yellow, green, blue, purple, red are qualitative continuum; white, grey and black are sensory qualities. Red light commences with 7800 Å. wave lengths; at 6300 it declines to orange; at 6000 yellow; at 5400 green; at 5000 blue green; at 4500 blue; at 4000 violet. When red and yellow lights are mixed it forms the intermediate colour of orange; red and green makes yellow.

Sound (Sabda) vibrations varying from 16 to 20000 per-second are only audible in human ears. Below 40 vibrations tones are usually weak and indistinct. The intensity and quality of sound vary with the striking force of the waves and the density and elasticity of the medium. Sound waves are carried through the ossicles to the cortical arborisation of the auditory nerve fibres, the peripheral axons of the spiral ganglia and thence into temporal gyri for their perceptions. With the damage to these areas though one can hear normally, he loses however the power of understanding the meaning of the words.

Small (Gandha) sensation is caused by bringing gaseous odiferous bodies as a solution in the moisture of the nasal mucosa and acting chemically on the sensitive hairs of the olfactory cells which transmit it through olfactory nerve fibres, bulb into glomeruli and finally into uncinate gyri for its perception. Odors are fragrant, ethereal, spicy, resinous, putrid and burned.

Taste (Rasa) are primarily four—sweet, bitter, acid and salty. Sweet and salty stimuli are usually confined to the taste buds in the circumvallate papillae to the top of the tongue; bitter at the back and the extreme borders of the tongue; sour on the borders and on the whole upper surface of the tongue. Taste buds are also found on the soft palate, epiglottis, vocal cords, larynx, back of pharynx and the inner surface of the cheeks. Taste stimuli are carried through the lingual nerve to uncinate

gyrus when perception is felt in close collaboration with olfactory sensations.

Tactile (Sparas) sensations include touch, pressure and thermal sensitivities. Cutaneous touch spots are spread over the entire surface, particularly on the finger-tips and mucosa. The heat spots are numerous on the skin of the cheek or forearms; and cold spots on glans penis and conjunctiva. Stimulus is in the localized lobes. And response consciousness is in the cerebral cortex which functions for integration and co-ordination for stimulus response, reaction and relation. Instinctive reactions are chain reflex. The intensity of any reflex depends on the physical and chemical properties of blood (automatic stimulation center) and on the interaction of reflexes. Neurasthenia is provoked by the exaggeration of excitatory and weakness of the inhibitory process; hysteria with the predominance of the inhibitory and weakness of the stimulus process. The velocity of motor nerve propagation is 120 meters per second. Instinct appears to be a very complex integration of innate unconditioned reflexes. The sense organs are (1) skin=touch, pressure, heat, cold=feeling; (2) Tongue=salt, acid, sweet, bitter=taste; (3) Nose=smell; (4) Eyes=light, colour, shape, distance=sight; (5) Ear=pitch, intensity, position=hearing. The hibernating animal like the anaesthetized loses all sense perceptions and consciousness. But the rise of temperature awakens its senses as the spring brings forth new foliage among the plants. So touch response to the change of temperature may have been the original basis of consciousness. Among the anaesthetized touch perception is the last to fade away. Sponges have diffused latent touch sensation if any. But the sensory hair of Echinodermata, bristles of Rotifers, sensitive antennae of insects give a concept of objects without actual physical contact. All primitive forms of life as plants and amoeba absorb food and air through any portion on the surface of the body. When liquid foods in solution are absorbed through the pores, there can be no question of the development of the organs of taste and smell. But even sponges have been seen to eject out unsuitable food. Like gills of fishes for respiration, an internal canal developed for the selection and rejection of food particles. This primitive nutritional canal evolved into organs of taste and smell. Through

smell food that was within the reach at a distance could be sought for. Snail and blood hounds scent their food and mates. In the breeding season the bodily odor of the females is intensified and which attracts the males for propagation. Scent is a sexual odor. Most plants and animals have their specific odors by which they differentiate their own species from their enemies. For subterranean creatures like earthworms, sight is unnecessary but among them smell is well-developed. It is only among the animals, mammals have developed upright or arboreal locomotion, flying insects and birds, motion in the air. Some skin pots became sensitive to light. There are eyespots in Flagellata and Volvox, and scattered pots in Chitonidae. For finding out food and mates sight became very important for birds, and colour has taken the place of scent among them. Through the development of sight, appreciation of colour and shape and thus beauty has been formed. Hearing like smell and sight developed to secure food and as a warning against the approach of enemies. Mollusks hear by means of otocysts. The ears of orthoptera, locusts or crickets are on the front leg. Like scents (voluptuous odors), and sights of colour and beauty of form, hearing of inviting soft tones became an important accessory in the selection of mates. The musical notes of insects and birds are their mating calls. Through sight and hearing our aesthetic consciousness has been much enriched. The skull that encloses and supports the brain, the co-ordinating conscious apparatus, is nothing but the extension of the vertebral column, containing the spinal cord—the involuntary automatic reflex cells (will cells) that control muscle fibres.

3.—MORALS

Morals and manners are conventional, not developed out of logic or reasoning. They are conventional out of religious thinking and speculations. The idea of good and beauty have been associated with happiness, if not in this world, in the after immortal existence. But soul or psyche is the function of the bodily nervous mechanism out of adaptability to envi-

ronment, to co-ordinate all its activities. When the body is disorganized and dead, there can be no separate existence for its nervous function. However in one form or the other in all religions the belief in the survival of the soul persists, so that it can enjoy the beneficial fruits of its Karma in the immortal life hereafter. And primarily on that faith principle Morals have been fashioned. The biological end of life is self-preservation and self-reproduction, and in their pursuits there are pleasurable sensations. But for the richness and fullness of life and for progress, experiences of pain and discontentment are also needed, as otherwise there would be no striving to remove them. Not only struggles for existence and competition for self preservation and securing desirable mates have been the evolutionary ladders of variation and progress, so also co-operation of individuals and groups, even among insects and animals. Even among insects there is cooperation and planned economy. Ants keep plant lice—aphids and coccids—as milking cows for their honey dew. When ants eat food they keep it between gullet and the stomach. Ants go up to one another and stroke it with their antennae. This is a solicitation for food. The solicitee ant will stop. The two will raise the foreparts of their bodies until their mouths are close together and exchange their food. Thus there is circulation of food among the ant colony, as there is circulation of blood in the vertebrates. Each particle of food is swallowed and regurgitated many times before it is finally digested. As the ants have the sense of taste well developed, thus the ants derive collective pleasure many times, not less than six, from their food. Social life among the bees reach its highest development of 50,000 to 80,000 bees, the vast majority of them being workers. The combs are made of wax which is secreted between the ventral abdominal plates of the workers. Cells in which workers develop are smaller than those destined to produce drones, while the largest are the royal cradles of future queen bee. The fertilized eggs develop into workers or queens according to the type of feeding they receive, and the unfertilized eggs develop into drones, which are produced according to the calculated needs of the colony. The worker bees when newly emerged are

mainly active within the hive, attending the brood, and nest building. As they become older they go out in order to collect nectar and pollen. They not only help each other mutually and collectively but always act collectively for the welfare of the entire colony.

For securing food and mates, for defence and offence, man has learnt to cooperate, to work as an organized unit, like our body which though consisting of billions of cells, some of which have been specialized, render mutual aid and work harmoniously, in the hard school of experience, in order to succeed. Thus he learnt to treat others sympathetically as he liked to be treated by them. Sympathy, attachment and love developed into humanity and universal kindness. It could not remain confined to fellow beings. It extended to domesticated animals. It could not be otherwise. They are sentient beings. Dog is very faithful and attached to his master. Horse is a sensitive creature. Cat is fond of patting, kitten of plays. Cow is affectionate. Elephant possesses great understanding and is capable of attachment. Lamb is very docile and meek. Kids are fine companions of children. Even stags when hunted out or wounded imploringly gaze at their hunters with their fine lustrous eyes for mercy. Jainism and Buddhism felt that man becomes cruel by nature by being cruel to animals. And they preached that sacrifice of animals to propitiate gods or god was an irrational religion. All are creatures of god. They possess feelings and soul like man, though of inferior kind. Man has passed through animal existence in his previous births (transmigration of soul) in the evolution of his existence. Cārvāka and Buddhists said that if the sacrificed animal became a messenger before gods to please on behalf of the sacrificer, why not then one should sacrifice his old parents or beloved sons so that they could plead for him better by affectionate devotion; or if the animal is sacrificed simply as a bait, so that being satiated with its flesh, the god would have no appetite left to fall upon him or his beloved ones and devour them, it simply reflected on their intelligence and silly conception of their god. The sacrificers could give no satisfactory answer to this Buddhist, Jain onslaughts. The only reply they put forward was that stimulating animal food was needed for our nutrition and health, and

instead of killing animals wantonly for our gluttony, by killing them in the name of gods, it spiritualized the whole conception of their lives; and as domesticated animals were useful in the social economy, by keeping more male animals than are needed for fecundation of their females and maintaining them when they became old and unserviceable, they would exhaust the food supply and thereby impoverish the entire stock; thus cows and she-goats in their reproductive period in the beginning, but later throughout their entire lives, were forbidden to be sacrificed, but not oxen and kids. Unquestionably there is some validity in their argument. Animal protein is needed in the growing period of our lives to impart a vigorous tone to our health and to preserve the nitrogenous balance, as it is not only stimulating and easily digestible, it contains some amino-acids which are lacking in milk, cereal and leguminous products. Now a days animals are killed not only to supply the ever-increasing demand for meat, but also for their glandular products which are being effectively used in the treatment of various diseases. Buddhists said that no doubt meat is palatable and nutritious, and if any one wanted he could take the meat of dead animals, as its endo-toxins are likely to be neutralized and destroyed by the high heat in the process of cooking. And many Buddhists in Burma take only the meat of dead animals. If not, let the animals be killed far away from your presence so that you are not affected by the sight of killing a living creature, and suddenly without causing it as little suffering as possible by a class of people who will remain in the lowest ladder in the society. Ahimsā became the cardinal doctrine of the Buddhists and Jains. Not only sacrifices of animals in the name of religion was abolished, but even for dietary. The nation became practically lacto-vegetarians. Even Brahmanism adopted it. And majority of Hindus to-day, especially of the upper classes, would regard it as a great crime to take meat in any shape, even as a medicine. Buddhists and Jains even opened hospitals for animals where their diseases were cared after as of human beings; and old and disabled animals were kept and fed. Many of the Pinjrapols still exist, particularly in Guzerat under the Jain influence.

Buddhist cardinal doctrine was that love, sympathy, service

to fellow human beings was the highest duty and religion of man. Brahmanism interpreted it that service to man was the service and devotion to god, as God dwells in all creatures, manifests himself through man, especially the superman (pureshottama). And they felt that the war was the cruelest, most inhuman and the supreme folly of man. There is hardly any justification of war which causes so much suffering and misery to human beings. It wantonly and ruthlessly destroys all the values of life. Economic developments which have taken ages to create are damaged to such an extent as may take generations to repair. The healthiest and spirited adolescents are killed and maimed, thus bringing forth racial degeneration. Man, carried away by false national, racial, patriotic or religious sentiments, gloats over killing his fellow man, thus brutalizing people and engendering their moral degradation. War solves no problem which cannot be settled by amicable conferences in an atmosphere of mutual toleration, understanding, reasoning, goodwill and compromise, if necessary. Buddhism outlawed war. Asoka discontinued the use of force, and even moral coercion, in his state policy. Some modern biologists defend war on the ground that it advances the progress of man by eliminating the weak, unfit and disorganized masses of humanity. But victory in war, might, fitness and success are not always synonymous. Practical utility and moral right are not the same thing. And it is problematical whether the victorious war has always brought out the physical and intellectual advancement of the victorious nation and furthered its expansion. If it were so then the ancient primitive methods of warfare might well be emulated with profit and pleasure. He killed his foe, took his land and wife. He added the wife to his harem, and cultivated and harvested the occupied land with her labour. He roasted his enemy and feasted with his friends on its savory meat, and jointly raped his wife with carousal, making drinking cup of his cleaned skull, and spear heads of his bones, thus pleasantly not only eliminating a powerful rival and competitor, thus also making the best economic utility and use of him. In the next stage of war, the defeated survived males were castrated, then enslaved to work as beasts of burden, shepherding the cattle or tending to the conquered.

lands. Their young women were distributed among victorious hordes. Later survived vanquished males were either blinded or the fingers of their right hand were chocked off to disable them to wield arms against their masters and used as serfs, and their women appropriated. In time it was found expedient to leave the conquered territories in the hands of the conquered; only they had to contribute to the victors a part of the produce as tribute, labour, and in war, men for the army. But with the invention of steam and electricity which can generate as much power as is needed, and time and labour-saving machinery, the needs of unskilled labour have been much reduced. Europe still believes in the political imperialism of Asia and Africa to exploit their raw materials. America believes in economic imperialism through finance and trade. No doubt the victor gets some economic advantages. And economic prosperity brings cultural and intellectual progress. With slave labour Athens became the most cultured people in the ancient world. The Arabs, the fierce nomads of the desert, with their vast conquests and economic prosperity, became the custodians of culture of the medieval world. But conquests bring many evil results. Conquerors become ease-loving and luxurious. It gradually corrodes their physical, intellectual and moral stamina. They learn to be tyrannical to their subject peoples whom they look upon with contempt. Once the habit is formed, they lose faith slowly in their own democracy, toleration and courtesy in dealings even with their own peoples. Tyranny and exploitation create among the subject and exploited peoples the spirits of resentment, hatred, falsehood as a defensive armour, and revenge. It lowers the human values for all. No wonder ancient China put the soldier at the lowest ladder of the society. There can be no moral justification of war. Fittest are not the only persons that survive in a war. Even the unfit may thrive as parasites. Though the Jews were deprived of their political freedom by the Romans and were scattered, they have spread all over the world and are prosperous everywhere. The major portions of Asia and Africa have been robbed of their political and economic freedom for centuries. Yet racially they have not been eliminated. Rather they loom large in world problems. For the control of their resources rival imperial-

isms have fought many sanguinary wars and will fight many more, bringing untold miseries to humanity. One imperial system may be dismembered and crushed to-day. And hardly the ravages have been repaired, another will rise in no distant future. Greed breeds greed. Imperialism invites rival defensive, later, aggressive coalitions for its dismemberments and conquests. The solution then is not the brutal method of killing rival competitive human beings through war to secure raw materials and market for manufactured goods in the conquered territories, but to make them available to all peoples on equitable basis. That will automatically—painlessly—eliminate those who prove their unfitness in the struggle for existence. Every race has some good traits. In an atmosphere of freedom and opportunities, majority of them may acquire co-operative spirit, educative tendency, technical skill, and inquisitive energy to unravel the mysteries of nature and to control and utilize them for the comforts of fellow human beings. Science is no monopoly of any victorious or conquering people. In the hospitals we look after the helpless and often hopeless invalids and orphans. We do not kill them to make better provisions for the able-bodied citizens. Instead of conquering and dominating less fit or primitive peoples, if they are left to their own resources, at least like orphans they can be educated with sympathy to make them fit in humane spirits. Brotherhood of man is the only solution. If humanity has not learnt it yet, after bitter experience it will learn in no distant future. Already humanity is groaning under the terrible burdens of wars and their resultant oppressions. The earth is immensely rich in natural resources much of which is still undeveloped. By international and interracial co-operation by their utilization mankind with its growing population can be well-fed and kept in comforts for millenniums. Instead of killing each other in war for problematical benefits, destroying economic values in its operations, if half of its energy and scientific research are spent in developing undeveloped portions of the earth as the Amazon region, Shashara by diverting a part of the Mediterranean waters into its depressions by canals, converting the solar heat of Sahara, Gobi, Rajputana, Australia into electric energy and light, converting wind velocity, tides

of the sea and water-falls into motor power, making synthetic chemical goods out of agricultural, mineral and manufacturing wastes, humanity would be much enriched and convert the Earth into a heaven for which the poets, patriots, prophets, fanatics, mystics and maniacs have shed so much blood and tears in vain.

Sexual Morals:—As by selection the domesticated cow, quite unlike her wild prototype, in order to secure a larger quantity of milk, much more than what is needed to feed her calf, has been made almost a milk producing machine; similarly for the gratification of the excessively stimulated aggressive sex urge of polygamous and promiscuous man, woman has become oversexualized, almost an erotic creature. She in turn feeling that man only seeks her for his sensual pleasures, has developed in her those sex-appeal features and amatory sentiments by which she can tame him into submission. There is a close season for mating among the animals. But not so among man. He has overcome by regular supply of protein and stimulating nutrition the limited periodicity of the animal. The animal female is only approachable during her ruts for reproduction. But man desires his sexual mate all the time. Not so however the woman. Her sexual needs are fewer even when she has cultivated its taste, just when ovum bursts out from Graafian follicles, at the time of ovulation, exactly 15 days before the onset of menstruation, and sometimes during her menses. Any ardent female may be good enough for the sensual gratification for man. But woman desires her psychic mate to be transformed into a sexual mate. Her sex is stimulated only when her feelings are roused. Man feels that his voluptuous sensation is incomplete if his sexual mate lacks ardour. Woman simulates it often to curb his wandering lust and bind him to her by this bond. For this sexual service of her person to his needs, she has bartered her personality and made marriage a trade to get a home and provision for her and her offspring. But as her sexual nature varies from frigidity to passionate outbursts according to her monthly cycle and thyro-ovarian pituitary-adrenal activities, man has often misunderstood and misrepresented her. Man usually mirrors woman in his own image. He is arrogant and vain. He says vanity

is woman. He is lustful, he constantly searches for the enjoyment of his oversexuality. And he calls her the temptress. He is so jealous that he does not allow her to associate freely with males. But he accuses her of jealous nature. His exuberant urge is quickly a spent up force, and he calls her cold and fickle. His polygynous nature constantly seeks varieties to gratify his sexual nervous irritation, and he calls her inconstant and cold. Buddha felt that we lay over-emphasis over our sexual needs and thereby provoke their cravings in a vicious circle. Complete sex sublimation is possible for many persons, if they are imbued with a great ideal for their own moral and spiritual advancement, without any physical and nervous harm. If not, sex-discipline is necessary for majority of the people to promote their health and moral purity and growth. Though marriage grants license to the husband to gratify his sexual cravings and impulses, his lust on his wife when she is unresponsive and sexual congress is distasteful to her, is a violation and outrage on her personality. It is worse than slavery. Buddhism preached against this sex bondage, for which economic freedom was needed for both. As marriage stands today, wife is economically dependent on her husband. A dependent and a slave cannot expect respect of her personality. She is almost a possession. Though she may be pampered and petted for her youth and beauty, she is a bird in a golden cage; it cannot but lower her self-esteem. Women must be economically free. Then she can independently select her psychic mate for common ideals, ideas and reciprocal affection and friendship. It will develop new types of peoples by natural selection. It will have a stimulating effect on the social progress. Free associations and friendships between men and women on a psychic plane would clear the atmosphere of the sexual tension. Men and women are afraid to form psychic attachments and friendships by open and free association for fear of public scandals which generally misconstrue them as sexual intimacies, thus damaging the proprietary right of the husband in his wife, and in the unmarried woman the chance of her happy marriage, as no one wants to marry a *damaged good*. If some of these

friendships lead to sexual unions by mutual choice, and the female partner singly or jointly takes the responsibility of the consequences of the connubial act, there is no harm to it. The mind, thought, ideas and ideals of man and woman continuously change, and they are in incessant flux, so there cannot be permanent unions, binding on both. But if the free friendship and sexual comradeship continue to be lasting, so much well and good. Throughout nature male seeks pleasure. The female even of the ferocious kinds looks for the comforts of her offspring. Lust dominates in males; maternal sympathy in females. The gratification of her sexual urge is a subordinate momentary unimportant act and episode in her life. But the consequent gestation and nurture take a much longer time and complete her sexual cycle. Mother instinct is dominant in woman. Buddhism enlarged this mother instinct of woman into social service. Women have natural sympathy. They have tender heart. They are very affectionate. Freed from sexual bondage and with economic freedom, many of the Buddhist nuns nursed the sick, succored the poor, the distressed and orphans, and many of them became great saints. In Thier Gāthā we find many pretty spontaneous outpourings of their hearts.

Government ;—The Government was both monarchical and republican. Kautilya (XI, 1) mentions the republics of Kamboja, Surāstra, Licchavi, Vriji, Malla, Madra, Kukura, Kuru and Pañcāla. The cabinet ministers in monarchies and councillors of republics were elected on functional representations. The army, trade-guilds, bankers (śreṣṭhis), learned bodies, lawyers, farmers, noble families, public functionaries sent their own representatives. Public functionaries were selected after competitive examinations as in China. Forests, mines, ocean products as salt and sea shells, key industries, public conveyances, ferries, minting belonged to the state. The state manufactured articles out of the products of the mines as copper, tin, lead, and iron for state and public uses. Villages and town heads were elected by the local citizens. The land nominally belonged to the state. But it was let out to the farmers on the basis of their contributing one sixth of the produce to the local granary. There were also state farms, orchards

and cattle ranges. There were always reserve stores of food grains for distribution in case of famine. If any farmer neglected his farming or evacuated the farm, it was cultivated by the local authorities through hired labour. Taxes were levied on commercial transactions, market sales, saloons and brothels. To prevent and to detect corruption, bribery, injustice there was a regular espionage system. Monks, nuns, priests, and courtesans were utilized as spies. In Yaudheyas Republic compulsory adult military training was the rule. Frontier fortresses were well guarded. Indirect taxation was preferred as it caused little disaffection. As the sun silently withdraws water vapour from the ocean and equitably distributes it over the entire land, so the the state should plan its taxation and economy.

4—LAW

Apastambha Dharma and Grihya Sutras where the social codes of the Andhras of the Gadavari area, in 2nd century B.C. Apastambha calls himself a southerner (2, 17, 17) by contrasting their customs with that of the North (Udīcya). He quotes Taittiriya Aranyaka which is prevalent among the Andhra Bramhins. He condemns Niyoga (2, 6, 13) and omits Prajāpatya and Paisaka forms of marriage (2, 5, 11), and does not mention mixed castes. Pallava inscriptions of sixth century A. D. show that they made land grants to Apasthambiyas. Apasthambha allowed beef-eating (1, 5, 7) while Gautama condemns it (17, 80). Baudhāyana Dharma Sutra was made for Kārnātaka. Pallava Nandivarmen of 9th century made some grants of land to Brahmins of Pravacana Sutra (Baudhāyanīyas). The great Sayana family, the commentators of the Vedas, of Vijayanagara of 14th century, were Baudhāyanīyas. Kumarila thinks that Baudhāyana (1, 1, 19) attacked Apastambha (2, 6, 16) who recommended local and family customs against sacred traditions. Baud. (2, 5, 21) calls Ganasa in various names as Vināyaka, Ekadanta, Lambodara.

Baud. (2, 5, 23) mentions 7 planets after the days of the week which were only possible in 3rd century A.D. Fourth Prasna is in verse, possibly a later addition as some of the subjects dealt in last 5 chapters are superfluous, being discussed in (2, 11; 3, 4.) Baudhāyana thinks that sea-faring is a custom of the north (1, 1, 20) and which is harmful (2, 1, 41). Baud. Grihya S. (2, 4, 6) allows Upanayana to Ratnakaras—charioteers. Hiranyakesi Dharmaśāstra is a branch of Apastambha as hundreds of Śūtras are verbally borrowed from it. In land grants of Kongu kings in 454 A. D. Hiranyakesi Brahmins are mentioned, who are found in large numbers in Ratnagiri Dt. of Konkan. All these three schools belonged to Taittirīya Śākhā of of Krishna Yajurveda. Gautama Dharma Śūtra belongs to Samaveda Rāṣṭryaniya who are found amongst the Maharatta and Telugu Brahmins of eastern Hyderabad. The last chapter of third Prasna of Gautama D. S. is borrowed by Baudhāyana. Baud. also quotes Gautama (11, 20) that local customs are preferable to Smritis; and if a Brahman cannot make a living by teaching, he can act as Kshatriya (Gautama 7, 4, 7). Many śūtras of Gautama and Vasiṣṭha are very similar, if not the same (Gaut. 3, 31-33 = Vas. 9, 1-3; Gaut. 3, 25 = Vas. 9-10; Gaut. 1, 41 = Vas. 3, 47; Gaut. 1, 40 = Vas. 3, 38; Gaut. 1, 45 = Vas. 8, 48; Gaut. 1, 28 = Vas. 8, 49; Gaut. 14, 5-7 = Vas. 4, 24-26). Gaut (4, 17) mentions that Yavana is the offspring of Kshatriya male with a Sudra female, which indicates that Gautama, though entirely written in Paninian prose, is not earlier than 8th century B. C. Vasiṣṭha Dharma Śūtra belongs to R̥gvedins of N. India, above Narmada. But it quotes (12, 31; 23, 18) Vajasaneyaka, (12, 24; 30, 5) Kathaka, and (23, 23) Tait. Aryanyaka. Vasiṣṭha quotes (1, 6) Harita which occurs in Baud (1, 2, 7). Vasiṣṭha thinks that documents are one of the 3 sources of proof (16, 10). He quotes Gautama (14, 14) twice (4, 35; 37). Vasiṣṭha quotes (19, 48) Yama which is found in Manu (5, 93); 18, 14 = Manu 4, 80; 18-15 = Manu 4, 81. Vasiṣṭha quotes (3, 2; 13, 16; 20, 18) Manu (2, 169; 4, 117; 11, 151). Vasiṣṭha (18, 4) calls the offspring of a Vaisya male with Brahmin woman as Rāmako (*Romans*). It seems therefore that Vasiṣṭha is not earlier than of 1st century A. D. Vasiṣṭha (6, 41) prohibits the learning of Mleccha language. Vishnu Dharma Śūtra seems

to be a code of Kathakas (Kathis) of the Punjab and Kashmir as some of the chapters (21, 73, 88) agree with Kathaka Grihya-Sutra (5, 12; 9; 3). But Kathaka (2, 3-4) mentions only two kinds of marriage—Brahma and Asura while Vishnu mentions 8 kinds (24, 18). Vishnu has 180 verses which are found in Manu Smṛiti and many are similar in contents but in prose. Several verses of Vishnu are also identical with Yājñavalkya Smṛiti (Vishnu 8, 41; 8, 38; 9, 33; 17, 17; 17, 28; 62, 9; 68, 51 = Yaj. 2, 63; 11, 19; 2, 97; 2, 138; 2, 110; 1, 31; 1, 117). Vishnu (85, 1-52) mentions sacred places like Sripurvata (in Darwar Dt. on the Tungbhadra), Saptarsha (Satara), Godāvari and southern Pancanada. It mentions 7 days of the week and calls Thursday Jaiva while Yājñavalkya mentions only seven planets with Rahu and Ketu. (3, 322). It calls for the first time book by pustaka (18, 44) = Gk. *parikon*; Gk. *kalamos* = Lat. *calamus* = Skt. *kalama* (reed pen); Gk. *melan* (black) = Skt. *mela* (ink) and *maḥa* (dirt). But 21 bells (43, 1) are identical with Yājñavalkya (8, 222). However it allows Brahmin to marry any one of the four castes (24, 1) and does not oppose Niyoga. Like Yājñavalkya (2, 240) Vishnu (5, 192) mentions minting of coins (*nānaka*). The week days are first mentioned in the Gupta Era inscription of 481 A. D., and Varāhamihira of 6th century mentions them. So it seems to be a work not earlier than 6th century. Manu Smṛiti has been recast many times. It was originally the law book of Minas or Mānavas. Then it was modified by the Bhṛigus who adopted some of the long-established laws of the land. That is the reason why Manu differs (8, 1; 4, 95; 2, 94; 2, 85; 2, 36; 3, 48) from Mānava Grihya Sutra (2, 12, 1; 1, 7, 7; 1, 20, 1; 1, 21, 1; 1, 32, 1; 2, 22, 1; 2, 12, 1). Manu and Mahābhārata have about 260 similar verses, 1/3 of Manu, especially scattered in 3, 12, 16 chapters. Manu (X, 44) mentions Yavanas, Kāmbojas, Sakas, Pahlavas, Cinas, Medas (Madras) and Andhras (X, 48) as Śūdras like Patanjali (2, 4, 10). But Patanjali (150 B. C.) does not mention Pahlava which Manu does. Parthian kingdom was established in 284, and Mithradates (171-138 B. C.) occupied up to the banks of the Indus at the time of Sunga (Sungas of China = Tang) Pushya-mitra as Brahmin imperial power. As all foreigners like Yavanas, Kāmbojas, Sakas and Pahlavas were called Śūdras and they

were invaders, after their defeat, so called Sudras lost in the heart of Pushyamitra and Kanva empires all their privileges, and the imperial Pushyamitra and Kanva Brahmin rulers became above all criminal laws. They enjoyed and occupied the privileged position, which is also reflected in Ramāyana, a composition of the period and the compilation of Moral Encyclopedia Mahābhārata which was finally recast in the Gupta period. Asvagosa in his *Vajracchedikā* however who lived with the Kushans said that Sudras were as learned as the Brahmins. Referring to Senāpati Pushyamitra, who displacing the last Maurya who was a dharmavādī (Buddhist), but irreligious (adharmaka) and a fool (mohatma according to Garga) he established the Sunga Brahmin supremacy. Manu (12, 100) says that Senāpati deserves to be king, supreme judge and emperor, being versed in the Vedas (or as same texts show that "the post of commander-in-chief, king, supreme judge, and emperor is deserved by one who is versed in the Vedas"). Manu (4, 61) forbids Brahmins to dwell in the kingdom of Sudra (Nanda Dynasty) and condemns the appointment of a Sudra as a judge (8, 20). Manu (12, 100) mentions Senāpatya (Senāpati Pushyamitra). Manu contains, due to various recasts, many contradictory statements. Manu (9, 59) sanctions Niyoga which is condemned a little later (9, 64). Manu recommends flesh-eating in Śrāddhas and Madhuparka (5, 31; 83, 35, 41) while its use is forbidden (5, 48-50) under all circumstances. Manu (2, 140) says that father is equal to 100 ācharyas, while in 2, 146, it says that ācharya is superior. Valabhi (Abhira) king Dhruvasena in an inscription of 571 A. D. mentions that he obeys the laws of Manu. Sabaravāmin (1, 1, 2) of the same age says Manu and others have given instruction and quotes Manu (9, 416) which is identical with Udyoga Parva (53, 64). It seems that the final text of Manu was recast in the Sunga (Sunga) Pushyamitra and Kanva (Kins) Brahmin supremacy periods. The text however seems to have been written about 100-150 A. D. Yajñavalkya Smṛiti belongs to White Yajur-veda of Vaisampāyana (Vaisya-Besai) school. Yāj. thinks the sight of yellow-robed people (Buddhist monks) as an evil omen (1, 279). Yāj. (2, 240) imposes fines on counterfeiters of Nanakas (coins) and on the examinees of coins who declared good coins to be counterfeited. Nanaka is the gold

coin of the Kushans (Kueichung : 78 A.D.), bearing the image of goddess *Nanāia*, Kassite *Ninā*—Rv. 2, 112, 3. In (1, 298) he mentions the planets after the Greek fashion and refers to zodiacs (*Sustha Indea* : 1, 80), and conjunction of planets and constellations (8, 171). This knowledge did not arrive in India before the beginning of 2nd century A. D. Yājñavalkya was the code of the Andhra Śalivahanas of 200-250 A. D. Yājñavalkya's commentators are S. India peoples where the laws were operative. Viṣṇūśeṣara in his famous digest on it *Mitaksāra* which is the authority on Hindu Law in all parts of India except in Bengal where *Dayabhāga* of Sulapāni, also a comment on Yaj. prevails, wrote it in 1050 A. D. in the reign of Vikramanka Kalyāṇa. Viramishra (1610-1840) of Crocha wrote *Viromitrodaya*, an authority in Benares school of Hindu Law, upholding *Mitaksāra* against its critics, especially Bengal school. *Nārada Smṛiti* is a recension of Manu, and grafted on Yājñavalkya as entirely a secular code for Nepal. Nārada allows remarriage of women (97). Nārada regards a person minor till his 16th year (35). Nārada (80) mentions *dināra* (*denarius*) pl. *denarii*) as a silver coin and a silver ornament. *Dināra* is the Roman silver coin (161-169 A. D.) of the value of $\frac{1}{2}$ Rupee, first mentioned in a Gupta inscription of 400 A. D. So Nārada seems to be not earlier than 5th century. The code of Manu ignores woman while Yājñavalkya recognises her as a legal person and she is allowed to hold property. *Arthasāstra* (science of wealth) of Kautilya (Kautila is the Gotra of Viṣṇugupta of Canaka village in Peshwar Dt.) is a practical treatise on political economy and administrative manual. In it silk from China (*China patta* : 2, 11) is mentioned. China is named after Tsin Dynasty of 247 B. C. Gold mercury ores (gold amalgam—*Rasa Kāncanikah*, 2, 13) are found in many countries. *Saranga* from Gk. *syrix* as tunnel is also used. Coral of Alexandria (*pravalakam alakandakam* : 2, 11) is also found, as well as *Prag Hunaka*—Eastern Huns. Though *Arthasāstra* contains rich materials of Maurya period, even of previous epochs, it does not seem to be the composition of Vishnu Gupta, the premier of Chandra Gupta, but a compilation of his school in 3rd century A. D. It is a book of realistic administrative policy, full of practical instructions and illustrated by historical examples. It became the civil

and penal code of the Maurya and Gupta empires. Kamandaka, minister of Chandra Gupta revised it and is known Kamandaki Nitisāstra which became the law book of the Guptas.

The benefit of doubt was given to the criminals. No one shall be punished in case of doubt. Having searched a criminal through cross examination and ordeals, the king may convict him (Āpasthamba, 2, 5, 11, 1-3). Kautilya does not mention anything about ordeals. The state used to compensate the owners for any theft of their goods (2, 10, 26, 28, 69) and the poor were helped. It was the king's duty to protect those who suffer from want in his kingdom (Ap. 2, 10, 25). All the cases were decided by the presiding judge (pradvivāka) with the assistance of 7, 5 or three Sabhyas or Dharmasthas (Manu 8, 18; Arth. 68), possibly representatives of the council, in a public hall, open to the public, and never in a private chamber (Sukra 4, 5, 7). The judge had to abide by the decision of the majority of Sabhyas, and if there was miscarriage of justice, not only the judge, but the Sabhyas were also to be blamed (Manu 7, 14; Yaj. 2, 4). If the judgement was annulled by the king in appeal, the judge was fined up to 1000 gold or silver pieces (Manu 9, 234). Arthashastra imposes a fine of 8 times the value (86). For graft and corruptions Savyas were fined twice the value of the suits. When a defendant was illegally prevented to express himself, a Sabhya was fined (Arth. 86). Fines thus realized were given away in public charities (Arth. 80). The ordinary Law Courts decided 18 kinds of cases:—(1) Sexual offences (striasangrahana); (2) Inheritance; (3) Title-suits of lands and houses; (4) Breach of Contract; (5) Non-payment of Debts; (6) Deposits and pledge (Nikshepa). (7) Slave and Labour; (8) Partnership; (9) Sales and Purchases; (10) Title-suits; (11) Gifts; (12) Assault; (13) Disputes regarding boundaries; (14) Theft; (15) Abduction (16) Gambling (dyutamavaya); (17) Robbery (sahāsa); (18) Defamation (Vākparasaya). The plaintiff had to file his complaint which he was required to prove by evidence. The defendant was allowed 3 to 40 nights adjournment, but not exceeding three fortnights (Arth. 68), to prepare his defence. For criminal offences and for non-payment of fines simple imprisonment was imposed in Bandanāgāra, and imprisonment with hard labour in state mines.

Contracts made through duress (apagraha), fraud (upadhi-kritah), intoxication, insanity, legally incapacitated (minor), against the spirit of law (as husband mortgaging his wife or selling her) are not enforceable in courts (*Arthā* 57; *Yaj* 2, 31-32; *Manu* 8, 198-168). And the punishment of a man for the commission of a crime varies according to his status and sense of responsibility. Thus *Manu* (8, 16) says that for theft the guilt of a slave shall be 8 times, of a trader 16 times, of a warrior 32 times and a learned man 64 times. But a guilty knowledge is necessary before one can be accused of conspiracy. "When a person supplies murderers or thieves with food, dress, any requisites, fire, information, any plan or any assistance in any way, he shall be punished in the highest degree. When he does so under ignorance, he shall be censured (*Arthā* 4, 11, 227; *Yaj* 2, 27; *Manu* 9, 271). Though the motive constitutes the basis of crime, negligence of responsibility cannot be exonerated. If the cart turns off (the road) through the driver's want of skill, the owner shall be punished with the fine of 200 panas, if there is any damage; if the driver is skilful (but negligent), he along shall be fined; if unskilful, the occupants shall be fined (for employing an unskilled or unlicensed driver). If a man is killed his guilt will be that of a thief (*Manu* 8, 293). But if he cries out to a passerby to get out he shall not be punished for the accident (the responsibility is shifted to the passerby: *Arthā* 4, 11, 232). The defendant could be represented by an agent (*pratinidhi*), advised and defended by lawyers (*Dharma-vanikas* and *rakshas*—traders and keepers of laws). Slavery of higher classes seems to have been abolished at least in Gupta period, if not in Maurya times. "Sale and mortgage of men is customary with the *Mlecchas*. But there can be no slavery for the *Aryas*, even not *Sodras* who are the souls of nobility (*Arthā* 70). The state took precautions to prevent the commission of crimes by guards of moving soldiers and spies in gatherings, hotels, restaurants, inns, brothels, theatres, lonely gardens and empty houses (*Manu* 9, 264). For confessions of crimes of "those whose guilt is believed to be true shall be subjected to torture. Pregnant women or those who have had recent delivery within a month shall not be tortured. Torture of women shall be half of the prescribed standard. There are four kinds of tortures. Canning, thrash-

ing, suspension from above (*upari nibandhan*) and water tube (*udaka nālikaśha* : *Arthā* 4, 81."

Capital punishment was meted out to those who helped the enemies of the king or conspired with them (*Manu* 9, 232), or robbed royal treasury or arsenals (*Manu* 9, 275). For betraying military secrets tongue was cut off (*Arthā* 4, 11; *Yaj.* 2, 302). False evidence was a serious offence. For a learned man banishment is prescribed; for others fines (*Manu* 8, 120, *Yaj.* 2, 81). But in order to save the life of a valuable person it was condoned for the first time (*Manu* 8, 104; *Yaj.* 2, 83). If a public servant allowed a prisoner to escape either from detention place (*caraka*) or prison, his property is to be confiscated (*Arthā* 8, 9). When a judge unnecessarily causes delay and tries to avoid the main issue, he shall be warned, if he repeats the offence and he shall be fined and dismissed; when he gives an unjust punishment, he shall suffer eight times the fines (*Arthā* 4, 10). Counterfeiting of coins (*Arthā* 4, 4; *Yaj.* 2, 240) and giving unstamped weights and measures (*Arthā* 2, 19; *Manu* 8, 403) were punished with fines. For adulteration of food and drugs a fine was imposed (*Manu* 9, 289; *Arthā* 4, 2, 204; *Yaj.* 2, 245). The sale of decomposed meat, or meat of dead animals was punished with fines (*Arthā* 2, 26, 192; *Yaj.* 2, 297). For passing urine or excreta in water reservoirs or on high roads was punished with a light fine, except for pregnant women and infants who were warned and compelled to remove the excreta. When an animal attacks a person and the owner does not rescue the attacked person, he is liable to fines (*Arthā* 4; 13, 233). For deliberately murdering a person, the murderer was put to death without any torture. But a poisoner was drowned. In case of a pregnant woman she was drowned one month after her confinement (*Arthā* 4, 11). But in self-defence an *atthayin* (an assassin, ravisher, an incendiary, a robber) could be killed with impunity (*Manu*, 8, 350). But if a patient due to negligence or ignorance of the physician dies, physician was fined (*Manu* 9, 284; *Arthā* 4, 1, 202; *Yaj.* 2, 2-3). For assaulting a person and injuring his limbs or eyes, a fine of second degree was imposed (*Arthā* 3, 18; *Yaj.* 2, 230). For abducting females, corporal punishment or death was imposed, and fines if they were slaves (*Manu* 9, 323; *Arthā* 4, 10, 235). For ravishing a maiden, highest fine or cutting off the

middle finger was imposed (*Manu* 8, 364; *Artha*. 4, 12, *Yaj.* 2, 288), and compensation to the father. And for ravishing a married woman, castration and confiscation of the entire property (*Manu* 8, 362; *Nar.* 14). If a female slave is ravished by her owner, a light fine was imposed on him; if by others, compensation to her, and a fine of double that amount to the state (*Artha*. 3, 18; *Yaj.* 2, 291). If master committed adultery with his female slave, thereby she became free (*Artha* 70); for committing adultery with a married woman, a heavy fine was imposed; in case of a slave, corporal punishment (*Artha* 4, 13). The adulterous woman was either fined or her nose or ears were cut off (*Artha* 4, 10; *Yaj.* 2, 288). For pederasty or sodomy a light fine, and for bestiality a lighter fine was imposed (*Artha*. 4, 23, 234; *Yaj.* 2, 298). For incestuous intercourse with one's daughter, aunt, daughter in-law, sister or step-mother castration was imposed (*Artha* 4, 13, 234; *Yaj.* 2, 292). If a deposit is denied, not only the deposit amount has to be paid to the owner, the depository is to be punished like a thief (*Manu*. 8, 29; *Artha* 3, 12, 183). For misappropriation of state property heavy fines and corporal punishment were imposed (*Artha* 2, 5, 59); capital punishment by drowning was imposed on those who destroyed embankment of water reservoirs (*Artha*. 4, 11, 427; *Yaj.* 2, 279). Highest fines were imposed on the forgery of state or private documents (*Yaj.* 2, 240). For defrauding custom duty, a fine of 8 times of the defrauded amount was imposed (*Manu* 8, 400; *Artha*. 2, 21, 110; *Yaj.* 2, 252). For violating the rules of trade guilds, the offending member was fined and banished (*Manu*. 8, 219; *Artha* 3, 14, 186; 2, 287). The guild could act as a legal person (*Yaj.* 2, 259). If a master married his female slave, her relatives under him as slaves became free (*Artha* 70). *Manu* (994) says that everyone after completion of his studies, between 24-30 should marry a girl of 12. *Artha* (80) mentions the minimum marriageable age of boys at 16 and of girls at 12; but the marriage was contractual. If the husband and wife could not pull on together, if they assaulted each other, if the husband absented himself for sometimes without making provision for his wife, if he was held guilty of any criminal offence, there could be conjugal separation (*tyāga*) and divorce (*moksha*), and the wife could remarry. But in *Manu* (9, 101) mutual fidelity is to continue until death.

And Manu's marriage is based on eugenic principles. He forbids marriage if in either of the families there is hereditary taint. In spite of wealth and position or mutual inclination if any family member of either the bride or bridegroom suffers from tuberculosis, epilepsy, insanity, hemorrhoids, diabetes, leprosy (including syphilitic ulcers) or criminality, or of relative, marriage is forbidden (*Manu* 3.6). Manu thinks marriage is a social function. The object of marriage is to produce healthy, energetic and ambitious children to promote social welfare and progress, and the individuals have to adapt their personal gratifications to that ideal. Personal fancies or incompatibility of temperament are not sufficient grounds for him either for marriage or for divorce. *Mīmāṃsā Gṛhya Sūtra* (1.7) mentions only two kinds of marriage—Brahma and Sautra. Brahma marriage is arranged by the family elders by their free choice and selection for their sons and daughters without payment of any fees by either party to promote the welfare and happiness of their children and social harmony. Sautra marriage was arranged with selected girls partly either on payment of a fee or on certain conditions as to her allowance or inheritance of property by her children in case her husband is married or marries again. All the law-givers allow the citizens to marry even female slaves (*Sudrāni*) if they desire. By marriage female slaves become enfranchised. But her children do not inherit property on equal terms with her husband's other children by freeborn wives. Manu does not allow wife to inherit any property. In case she has no sons, her daughter's sons inherit them. *Artha* (62) allows sonless daughters inherit the property. *Yaj.* (2.185) allows sonless widow, and her daughters, if any, to inherit the property. Money was sometimes borrowed on bonds of honour (*carita bandha*; *Yaj.* 2.61) without any other security, but payable with legal interest. Oath bonds (*satyankara*) without any security or even written document had to be paid with the double amount borrowed. Mortgage bonds (*karana*; *Manu* 1.154; *Artha* 8) was registered, and initialled by *Adhi-karana* and it was called attested by king (*rāja sākebhikam*; *Pīṣhu* 9.8). *Rājataragini* (6.48) corroborates it. *Yasakara* in an appeal case where a document was forged by altering *rahitam* into *sahitam* found his registration clerk

(adhikarana lekha) guilty who being bribed made the change.

Hittite (Khatti) Code: formulated by Suppiluliumas (1350-1350) or his son Mursili (1347-1310). (1) If one kills a free man or woman, and in his or her place 4 persons are given as substitutes, the murderer may be discharged. (2) If one kills a male or a female slave and gives in his or her place 2 male or female slaves, he may be discharged. (3) If one causes a grievous assault on a free person and in consequence he dies, if two persons are given in his place, the assaulter may be discharged. (4) If one kills a merchant of Hatti town, but gives to his family 100 *Manas* of silver, his murder is condoned. (7) If by an assault one falls down teeth of a freeman, but formally pays him one *mana* of silver, now only 20 sickles of silver, his guilt is condoned. (20) If a slave escapes and is given shelter in another house, and if the former master can seize his slave, the shelter-giver is to pay a fine of 12 sickles of silver. (29) If a girl is engaged to boy and he pays his purchase price (present), but the father of the girl refuses to deliver her to his fiance, father has to pay him twice the fee he received. (30) But if the fiance refuses to marry the girl he loses the fees he paid. (31) If a free man marries a female slave and they have children, but they cannot pull on together, they may divide equally the house, other properties and the children. (33) If a slave marries a female slave, they have the same right. If a slave by purchase money or presents marries a free female, there can be no conjugal separation. (35) If a free woman marries a perfumer or a baker without purchase money paid to her parents, she becomes a slave for 3 years. (37) If one steals a cow, he has to give to the owner, formerly 12 oxen, now 6, to discharge his obligations. (94) If a freeman commits a theft, he was fined formerly one *mana* of silver, now 12 sickles. (95) If a slave commits theft he is fined 6 sickles of silver, and his ears and nose are cut off. (137) If a man violates a cow, he is imprisoned; he may even be killed by the king. (139) If a man ravishes his own mother, daughter or his son, imprisonment is the punishment. (490) But if men or women unite out of their own free will, no punishment. If one ravishes his step-mother, no punishment; but if his father is alive, he is to be

imprisoned (191). If free men unite with free women out of mutual love, no punishment. But if in spite of warning they commit it twice, imprisonment is the punishment. (193) If a man marries a woman and the man dies, she can marry his brother; if he also dies, his father; if he also dies, if she marries his brother, though he is married, there is no punishment. (197) If a free man unites with a female slave, no punishment. If a free woman unites with her near relative, no punishment. If both father and son have sexual intercourse with a female slave or a prostitute, it is no offence. (195) If a man unites with his brother's wife when he is alive he is to be imprisoned. If a man marries a free woman and has sexual intercourse with her daughter (by a former husband), he is to be punished. If a man marries a girl, then has sexual intercourse with her mother or sister, he is to be punished. (198) If a male slave of one copulates with a female slave of another, both of them have to pay fine of a lamb. (197). If a man violates a married woman in a lonely place, he has committed a crime and he is to die. If he commits sexual intercourse with her in her home and her husband can seize them in that posture, and kill them, there is no punishment for him. (198) If they can be brought to trial in the court, the husband may say, "my wife shall not die", and she will be pardoned. Likewise the husband can have the adulterous man pardoned. But on their foreheads will be marked that 'they deserve death.' (199) If one has sexual intercourse with a dog, the court may pardon the offender. If with an ox, the ox has to be killed and the person has to be fined with a lamb (ox also sacred in Greece as in India. In Plato's *Protagoras* 820 we find: grazing at will like sacred oxen). If one has intercourse with a swine, no punishment; and the offender should not be brought to any trial. (200) If one has intercourse with a horse, mule, or goat there is no punishment and no trial. But he cannot be a priest. If one has sexual intercourse with a foreign woman as well as with her mother, no punishment. If one commits pederasty with a carpenter or potter boy he is to be fined with 5 sickles of silver.

Hittites (Egypt. *Kheta*; Assy. *Khatti*; Bib. *Heth*) came to Anatolia in two waves, speaking both *centum* and *satem* varieties of Indo-Aryan speech, but having the same hyper-

brachycephalic head, prominent hooked nose without any nasal bridge. Their representatives are present day Armenians and Parsis. The inscriptions of the centum branch of the Hittites are in cuneiform, found chiefly in Halys river bend. Its writing is closely related to Cretans. The language is allied to Luwian or Luwili. They conquered Egypt as Hyksos in 1635 B. C. where they ruled for centuries and introduced their language. They were conquered by the satem branch of the Hittites who established the New Hittite Empire in 1335 B. C. whose *hieroglyphic* inscriptions have been found throughout Anatolia and Syria. Their language is closely allied to Lycian, Armenian, Phrygian (Phrygon = Bryges = *Far. Bārigus*) and Urartian (*Pur. Aratta*). These satem-speaking Hittites were called = *Purush-Khatti*, known in Iran as *Parsa Khattiya*, in Purans as *Kshatriya Purus*. About 1200 B. C. the New Hittite Empire fell under the impact of Phrygon (Bryges), Dananae (*Dananae = Dānana*), Pelasta (*Pelasti = Philistine = Palaesti*), Tyrians (*Etrurians = Heb. Itar = Pur. Itara = Aitaras*) and Achaeans (*Ikshvākus*). With the breakdown of the New Hittite Empire the cuneiform Hittite disappears, but hieroglyphic Hittite inscriptions, both royal and private, prevailed up to 700 B. C. In 717 B. C. the last of the small Hittite state of Carshemish was conquered by the Assyrian ruler Sargon II. Centum Hittite *ekwas* = Lat. *equus* = Satem Hittite *asuwās* = Lycian *esbe* = Avestan *aspa* = Skt. *asva*. Sat. Hit. *sumis* = Skt. *śringas* = Lat. *cornus* = Gk. *keras* = horn; Lithuanian *karvė*, Slavic *krōva*, *korova* = cow. Sat. Hit. *swanis* = Av. *span* = Skt. *śvan* = Lith. *suo* = Gk. *kuon* = hound. Sat. Hit. *titas*, *tata* = Skt. *tata* = Arm. *hayr*. Cen. Hit. *amāk* = Lat. *me* = Gk. *eme*, *amoi*, *me* = Sat. Hit. *amu* = Lyc. *amu* = Skt. *me*, *mayam* = *me*, *my*. Lyc. *glā* = Skt. *kulam* = clan. Sat. Hit. *kupa* = Skt. *jani* (a wife) = O. Slav. *zena* = Russ. *jana* =. Pers. *zanāna* = Gk. *gyne* = Swed. *quinna* = a female. Sat. Hit. *kis* (who), *kiskis* (whoever), *kisha* (anybody) = Av. *cis* = Skt. *kim*, *oit* = Slav. *cito* = Gk. *tis* = Lat. *quis*. Lyc. *tasn* = Skt. *dasam* = Lat. *decem* = Gk. *deka*. Lyc. *sata* = Av. *satem* = Toch. Skt. *satam* = Lat. *centum*. Cen. Hit. *aika* = Sat. Hit. *ias* = Gk. *eis* = Skt. *aka* = Lat. *unus* = one. Sat. Hit. *t* (n) *wai* = Skt. *dvo* = Gk. *dwo* = Lith. *du*, *dvi* = Lat. *duo* = two. Sat. Hit. *trai* = Cen. Hit. *teras* = Skt. *trayah* = Toch. *trai* = Gk. *treis* = Lith. *trys* = Lat. *tres* = three. Sat. Hit.

lamanese = Oen. Hit. laman = Lat. nomen (gnomen. Lat. gnotus, agnatos = Skt. jātās, jātī = Goth. knodi = agnates = intimately known agnates or kinsmen) = Gk. onoma = Russ. znamenie = Skt. nāman. Many Khatti Hindu deities are identical.

Hammurabi Laws (2100 B. C.) :—(5) Any Judge conducting a trial and rendering a written decision shall receive 12 fold the punishment if the decision subsequently proved to be erroneous. (22) Any person convicted of robbery shall be put to death. (28) In event any one is robbed and the robber escapes, the owner of the property on oath shall make claim of the property robbed, whereupon the municipality wherein robbery has taken place shall compensate him for the loss. (86) The field, garden and house of a taxpayer cannot be sold. (59) In event one borrows money upon a field and fails to raise grain or sesame thereon, to repay his creditors, his indebtedness is not extinguished. (68) Anyone failing to keep his dam in repair and through his neglect, if his neighbour's lands are flooded, he shall compensate the owners of the damaged lands. (110) In event a virgin of the temple opens (sells liquors) or enters a bar for the purpose of a drink, she shall be burnt up. (124) Anyone depositing with another gold, silver or any personal property before a witness shall be entitled to have restored to him the articles in undiminished quantity. (138) If anyone has sexual relation with a woman without any formal contract, she shall not be regarded as his legal wife. (139) If anyone's wife is captured with another person in sexual congress, both are to be thrown into water. But in case the husband forgives the wife and the judge the man, there shall be no punishment. (180) If anyone violates the wife of another without her consent in her father's house, and the ravisher is captured, he is to be drowned, and the woman shall be regarded as blameless. (181) If a husband slanders his wife and brings a charge against her of adultery, and if it is not proved, she is to make an oath of her innocence and return to her house; but if she is found guilty then shall she jump into the river in place of her husband. (138—35) In event the husband is taken a prisoner of war while in spite of ample means of life sustenance in the house, she leaves it and goes

into another house, she shall be taken before the court and thrown into water. But if there is no provision in the house, she shall in that case be regarded guiltless. But when her husband returns to his home, then shall the wife return to him. But children born of the new union may remain with their progenitor. (136) If any one leaves his home, runs away (deserts and abandons his wife) and thereupon his wife goes to another house; if then he returns to home and wishes to take back his wife, she is free to refuse to go to him. (138) If a man divorces his wife for her not bearing him any children, he shall give back to her the presents and contracted sum from him to her at the wedding and also the dowry she brought from her father's house. (148) If a man marries and wife becomes sick and he then marries again, he shall not cast out the sick wife, but shall keep her in his house and support her so long as she lives. (149) But in case she does not want to live in the house of her husband, he shall be compelled to return to her the dowry. (154) If any one has carnal knowledge of his daughter, he is to be driven from the town. (155) If anyone betroths his son to a girl and the son accepts her as his wife and the father of the son is convicted of having committed adultery with his son's wife, the father is to be bound and thrown into water. (156) If the son does not accept her as his wife and father cohabits with her, he shall pay her $\frac{1}{2}$ mine of money and return her the dowry she brought. She may then marry the man of her choice. (157) If any one unites with his mother after his father, then both the wife and son are to be burnt up. (159) If anyone brings presents to his proposed father-in-law and then refuses to marry the daughter, he forfeits his presents. (160) But if the father-in-law refuses to give his daughter, he shall return the presents. (163) In case the wife dies without any issue the father of the wife shall return to her husband presents and security property, and the dowry shall revert to the wife's father. (177) Any widow who shall desire to enter into the marriage contract, having ungrown children, shall not be permitted to remarry without first gaining permission from the court. The court

shall ascertain the value of the estate of her former husband which will be given in her custody and of her new husband to be kept in good order for the maintenance of those children and to hand over the property in fact when they attain their majority. (195) Anyone assaulting his father shall suffer the loss of his hands. (196) Anyone destroying the the eye of another shall suffer the loss of an eye as punishment therefor. (215) If a surgeon performs an operation upon a freeborn patient with knife and cures him and the eye is saved, he is to receive 10 shekels of money for his services. (218) But if the patient dies or his eye is lost, the surgeon shall have his hands chopped off. (229) If a builder builds a house for anyone and does not complete it firmly and it collapses and kills the owner, the builder shall be put to death. (232) If it destroys property he is to make good all that has been destroyed. He is to build up the collapsed parts out his own materials; (238) If the wall threatens to fall the builder is to make the wall firm out of his own money. (214) Anyone employing an artisan of a guild shall pay him at the following rates; a tailor's wages shall be 3 grochen; a carpenter, 4; a mason 4. (279) If any one buys a slave, male or female, and claim is laid to them (by a third party), the vendor selling without right so to do is responsible both to the owner and purchaser. The Hammurabi (Samarabi) Laws were the legal code of the Amorites, the Assyrian Amurru, the Rigvedic Amura (7, 61, 51, Egyptian Amar, Punic Amara.

The contribution of Hindu Law to criminology is that with the higher responsibility, education, social status and culture, the greater is the punishment. And the object of punishment is not social revenge—an eye for an eye of the Hammurabi Code, but to transform him by rousing in him moral sense of responsibility into a useful member of the community. A Brahmin guilty of drunkenness or adultery was punished much higher than a low class man who was let off lightly as much better could not be expected of him. The punishment in a criminal case was given, taking into every incident the motive behind every action and the circumstances that led it. Everyone is not born with the same instinctive urge and its active inhibiting control. Heredity and environment

vary in each individual case. Glandular functionings in two persons are never the same. With weak adrenals anger is not quickly manifest and it is easily under control with disciplinary training from childhood. With intoxicating potent sexual glandular irritation but weak inhibiting centre, self control may easily be lost in some while in others the creative urge may be transformed into many useful activities. One may lie and cheat just for self preservation and for the maintenance of his wife and children when he cannot secure any employment ; while a capitalist may within legal bounds water his stock and shares and thus deprive hundreds of thousands of their life savings. One may make a lying misleading statement in order to hide his nefarious plans ; another may tell a lie in order to protect a trusting lonely maiden from her guileful seducer and ravisher. Though truthfulness is needed for mutual trust and confidence, yet there may be circumstances when falsehood is not only justified, but may be recommended for higher moral ends. Homicide is a terrible brutal crime. Yet during war in the name of false patriotism, aggrandizement of state, glorification or its defence, millions of otherwise sane men organize themselves to kill other millions of their enemy states like packs of angry wolves, and gloat and advertize, though there were no personal enmities, their success in brutal killings, while in normal times to relieve distress in famine, flood or earthquakes, to control epidemics, to mediate hopeless, helpless incurable invalids, paralytics and insane, they will send their savings. Here motive makes the radical difference. The soldier kills his fellow beings not to satisfy his personal grudge but submerges his personal sentiments and interests to that of the state, and if necessary, he makes the supreme sacrifice in the act of killing of his own life for the benefit of of the unborn generations of his own nation. In his brutality there is no tinge of selfishness, rather idealism though it may be motivated by mob hysteria. But Buddhism thought it was a crime against humanity and abolished capital punishment as man possesses enough moral regenerative powers. There is a beautiful Buddhist story. Ananda, Buddha's cousin and comrade, was thirsty. A Chandāla (Gond) maiden

was drawing water from a well. Ananda asked her to give him a cupful of water to quench his thirst. But I am a Chandala girl. Ananda replied, I ask not your caste but water to drink. She gladly gave Ananda water to drink. Ananda rested nearby under the shade of a tree. Chandala Matanga thought Ananda was enamored of her. And Matanga wanted to follow Ananda. Ananda tried to dissuade her from such course. Ananda said, I am a Bhikshu. I have no fixed abode, no independent means of living. I wander from place to place to preach the great doctrine of the Buddha as to how to obtain liberation (moksha) from the worldly causes and anxieties. People will ridicule you if you accompany a moneyless Bhikshu like me. "Ananda, you know nothing of woman's heart. When she loves for the fulfilment of her heart's longing she cares not for wealth, position or public criticism. Love fills her soul. That becomes her universe. She desires nothing else than to be united with one she loves." "But suppose they do not only revile you, they slap you on one of your cheeks". "If they slap me on my right cheek, I shall turn then my left cheek to them to be slapped, and thanking them that they have not done me worse." "But if they assault you severely." "I shall praise them that they have not killed me." "If they kill me, smilingly I shall embrace death with no revenge for them, but only loving thoughts for you, and my love-soul shall be forth-with united with you." "But if they kill me instead." "I shall protect you with all my might and stratagem. And if I fail, I shall kill them in your defence. For has not the Enlightened One said that for the protection of a domesticated animal, you can kill the ferocious wild tigers. For self-preservation you can kill wild animals like antelopes and boars for their meat. To protect yourself from famine you can live on the meat of domesticated animals. For the defence of a traveller or a householder you can kill a robber. You can kill an inferior man for the preservation of learned or superman. There is no harm in killing, if necessary, inferior beings for the benefit of superior beings. That is the law of organic existence, the principle of progressive evolution."

5.—DOMESTIC RITES

Dharma, religious observances, is $\sqrt{\text{dhri}}$ = support = Gk. *thromos* = Lat. *firmus* = Lith. *derms* (treaty) = Lat. *forma* = constitution. **Rites** = Skt. *riti* = customs. Ved. *rita* = Av. *ritam* = Lat. *ritus* = Gk. *aretas* = virtue.

Pumsavana (*Av.* 6.2,1) is the ceremony of generating a male child. "In the third month of pregnancy or when it becomes apparent under the constellation *Tiaya* the husband gives to eat to the wife the curds of a cow with two beans (testicles) and one grain of barley (penis) in presence of a branch of *Nyagrodha* tree with fruits (which look like testicles (*As. Gr.* 1,13,7 : *Ap. Gr.*)). In the 4th month the husband parts her hair upwards with a bunch of an even number of unripe fruits and porcupine quill that has 9 white spots, ordering two lute players "sing (praise of) King Soma". To secure a rapid delivery, there is *Sasvantikarma* of reciting *Rv.* 5,78,99 and sprinkling the woman with water (*Br. Up.* 6,4,23). "When a son is born, he (father) should before other persons touch him, give to the child to eat honey and clarified butter in which gold has been rubbed by means of a golden (spoon) with the verse, 'I give into thee knowledge of honey and ghrita which is produced by god Savitar, the bountiful; may you have a long life and may you live in this world for hundred autumns, being protected by the gods (*As. Gr.* 1,15,1-4). The child should be named on the day of birth according to *As. Gr.* ; *Sans. Gobhita Gr.* But according to *Yaj.* (1,12) on the 11th day and according to *Ap. Baud. Bhar. Par.* on the 10th day (*nāmakarana*). Tenth day seems to have been the Indo-Aryan custom. *Dhatri*, the midwife and nurse = Gk. *tithne* = wetnurse, Lat. *filare*, femina = giving suck, is given new clothes and presents. Sk. *Prāna* is life or vital force ; Gk. *pran*, the prone posture of animals and man. The Greek wife in her labour pains prayed to *Artemis* and *Hera*. When the birth had ended happily, delivery clothes were brought to *Artemis* as an offering. *Artemis Brauronis* also received the clothes of women who had died in childbed. When a male child was born in

Attica, an olive wreath, and if girl, a woolen fillet was hung on the outer door. On the fifth day after birth *amphidromia* was celebrated. Father ran naked round the hearth with the child in the arms. Friends and relatives came with presents, especially polypi and cuttlefish. Women, who had assisted at the birth and thereby became unclean, cleaned their hands on this day. Father and relatives decided on that day whether the child was to be kept or exposed. Then there was a banquet. On the tenth day after its birth the child received its name. And this festive occasion was celebrated with sacrifices and banquets for friends. Relatives, friends and slaves to whom the child was shown for the first time gave presents to the child. Roman wife made offerings to Nymph Egeria during pregnancy to ensure an easy birth. At the time of delivery Lucina and Diana were invoked. A candle burned in the lying-in room. At the time of delivery three men stood round the threshold, beat it into a hatchet then with the pestle of a mortar and finally swept it. This was the symbolical killing and destroying and sweeping away the goblin *silvanus* who might trouble the woman in childbed. After the first week lustrative ceremony was held, and boys got their names on the 9th day and girls on the 8th day.

Cur&karma is the tonsure. *As. Gr.* (1, 17, 18) says it should be performed for boys and girls in the third year or according to the family custom. According to *Manu* (2, 35), *Baud. Gr.* (2, 4) it may be performed in the first or third year. Aryans used to keep their hair long. Alpinea introduced shaving of hair. In the adoption ceremony of the Germans, hair was shaved with festivity. And the head of children of Slaves and South Slaves were shaved ceremoniously even recently (*Schrader: Haartracht in Reallexicon*). Skt. Kesa, kesara = Lat. caesaries = Gk. kour-is (in the hair) = hair. Buddhists and Brahmins shave the head of monks and nuns at the time of their initiation ceremonies. Upanayana is introduction to the teacher, and initiation by him through which he gets a new intellectual birth (*Ātma*). It is a maturity rite. The pubescent is taught the lore of his race. *As. Gr.* (1, 12, 1), *Gobhila* (2, 10, 1), *Baud.* (2, 3, 1) state that a Brahmin boy should have Upanayana ceremony in the 8th year of his conception, a

Kahatriya in the 11th year and a Vaisya in the 12th year. Parsi Naqot in which the Parsis wear the sacred girdle (*kusti*) like the *upavit* of the Dravid, is from Pers. *nawjad*—newborn, though Parsis think it is a shortened form of *nava-zastar*—new priest. Gk. *Telete* is the rite of accomplishment. Behind the Doric pillar of Artemis, there is an inscription *telete*—rite of maturity. The marriage was the initiation of the maidens. Roman *initio* meant introduction into the mysteries of life and love. Among all the primitive peoples there is an initiation (training, instructing) rite at the threshold of maturity by which they become full members of the communities. In some tribes by these rites they are initiated with wild sexual unions.

Vivāha is the marriage, the most important of the rites. *Yaj* (1, 54), *MBA* (1, 131, 10) advise that friendship and marriage should take place between those whose wealth and learning are similar and not between the opulent and poverty-stricken. *Yaj* (1, 54) emphasizes the importance of family heredity. Families that are for ten generations famed for learning and free from diseases that are hereditarily transmitted, are to be selected. *Manu* (3, 6) advises the avoidance of matrimonial alliance between near relatives (*saptadāra*) and between families that suffer from epilepsy, insanity, tuberculosis, diabetes. *Bhavad Gr.* 1, 11 suggests that a girl is to be selected for her intelligence, family, beauty and wealth. There were 8 kinds of marriage. Marriage based on the selection of the parents of both of bride and bridegroom families was called *Brahma*; the bride received dowries from both sides in shape of ornaments. When the father gives his daughter in marriage as return of having received some service, as to a priest, was called *Daiva*. When daughter is given in exchange of some values as cattle, it was called *Arsha*. When the father selects a good boy of an excellent family and gives him his daughter, it was called *Prayadatyā*. When on receipt of valuable presents father is induced to consent his daughter in marriage, it is called *Asura*. Marriage through abduction of the unwilling girl is called *Rākasa*. When one secures a girl through intoxication, or bribing her keepers, it is *paissas*. Marriage through mutual selection is called *gandharva*. For three nights sexual intercourse of the married couples was forbidden. But marriage

was not forbidden even with a femaleslave (*sudrāni*). One should take for wife an adolescent of the same caste, but of a different gotra, who is a virgin, but a *Nagnikā* (*Hiranyakesi* Gr. 1, 16, 2). A bride that is a *nagnikā* (who is capable of lying with her husband : *nude* for sexual union with strong sex urge : *maṇagnā* in Av. is the name of prostitute with overwhelming sexual urge) is the best of all (*Gobhila* Gr. 8, 4, 6). The married couple shall not take alkalies (*kshāra* = carbonate of potash) and salts (*lavana* which were regarded as reducing sexual desires), abstain from sexual intercourse for three nights, but shall sleep together on the ground (*Gobhila* Gr. 2, 8, 15 ; *Apastambha* Gr. 3, 8, 99 ; *Saṅkh* Gr. 1, 17, 1). After the third night there was *Garbhadhāna* (*Yaj.* 1, 11), known as *caturtha karmā*. Sexual intercourse may be enjoyed after the third night. But the proper time should be when the bride becomes free from menstrual flow if she is in her menses (*Gobhila* Gr. 3, 5, 1 ; *Saṅkh* Gr. 1, 17 ; *Paraskara* 1, 12). If the bride is in her menses during the marriage ceremony a slight *prayścitta* is prescribed (*Baud* Gr. 4, 1, 10 ; *Kausika*. Sutra 79 ; *Vaikhāṇasa* Smṛiti Sutra 6, 13). The husband's age used to be 80 (*Mān* 9, 28). The bride at least used to be pubescent while *Kāmasūtra* says that bride should not be more than 8-7 years younger than her husband, preferably 8 years only, and the husband's age should be 33 years. That means that bride should be 80 or 26.

In Greece in the selection of the mate neither the bridegroom nor the bride had any voice. The respective parents arranged the match. But betrothal (*eggasis*) was the indispensable condition of marriage as *vākdāna* among the Hindus (*Mān* 8, 15, 2). Failing the ceremony of *eggasis*, issues of marriage were regarded as illegitimate. *Eggasis* was simply a contract between the suitor or his father and the legal guardian (*kýrios*) of the maiden, her father or brother. Dowry was essential for a respectable marriage. But it was a moral and not a legal obligation on the part of the father or brother of the girl. It was usually given in the shape of money. Husband had no right over it, but enjoyed its usufruct. Divorce was easy. Husband could anytime send his wife with her dowry to her father's house. But Homer mentions that the bride price (*edna*), calculated in the number of oxen, was paid by the suitor to the

bride's father. An Athenian could not marry a foreigner. Marriage of cousins was common. Union of uncle and niece was possible, even of aunt and nephew. Roman marriage was originally confined within the limits of the *gens*. Then the girl was transferred from one *gens* to another. The bride any way was transferred from the *potestas* of her father to the *manus* of her husband. The necessary conditions of marriage were: (1) the families of both parties must possess *ius conubii*; (2) The parties must not be within the prohibited degrees of relationship (*cognatio*—Hindu *sapinda*). Originally no *cognati* could marry who were within the seventh degree of relationship; that is even second cousins could not marry. (3) The consent of the parents was absolutely necessary, but not that of parties themselves who were often betrothed by their parents at a very early age: Cicero betrothed his daughter when she was only 10 years old. Betrothal (*sponsalia*), though not binding, was preliminary to marriage ceremony; (4) the bride and bridegroom were required to be above childhood, casting aside *toga praeterea*. The bride had to put on the wedding dress of *stammum*, a red hood and *tunica recta* with a woollen girdle fastened with *nodus herculeus*, a knot, the like of which was used for binding wounds. Her hair was parted into 4 separate locks by the bridegroom with a spearhead (*hasta corollaris*), reminiscent of marriage by capture. Then under the guidance of a married woman (*pronuba*), the bride placed her right hand in the right hand of the bridegroom (*dexterarum iunctio*—Hindu *Pāni grahana*) in the bride's house before the hearth when a cow or a pig (the sacrifice of pig, an Etruscan marriage sacrifice) was offered by the pair for sacrifice, the skin of which was stretched over two seats on which the bride and bridegroom had to sit; and the persons present shouted *facitecer*. The wedding banquet followed till evening. The bride was taken, as it were by force (*deductio*) from the arms of her mother, and led in a procession to the house of her husband, by three boys, sons of living parents, one of whom carried a torch of white thorn, while the other two held her by the hands. Flute players and torch bearers led the procession. On reaching her husband's house, she was lifted over the threshold. Then she was seated before fire and a jar of water (*aqua et igne accipere*). She

brought with her a dowry (*dos*) which became the joint property with her husband and *dos* as well as *patrimonium* of the father her children inherited. Marriage took place before puberty at 12. Wife offered sacrifices to the household gods in the *Atrium*. *Atrium* (Skt. *atri*—devouring fire; *athari*—flame; Av. *athar*—fire altar) was the hearth, the fire altar where household goods—*lars*—were worshipped, in the common room where the family members met. Here were collected round the sanctuary the sacred possessions of the family, the nuptial bed, ancestral images, the spinning wheel of the mother, the chest of the domestic records, all entrusted to the guardianship of the wife. Iranians attained their maturity at the age of 15 (*Yas.* 9, 5; *Vend.* 14, 15; Roman at 14). On the day of betrothal (*nām padvun*) among the Parsis, woman of groom's family, visit the house of the bride and present silver coins to her and the groom receives similar presents from the woman of the bride's family. Between betrothal and marriage the bride in religious prayers receives for her the name of her affiancé. Betrothal is the solemn part of the marriage (*mithra viro maza*—pledge of the magnitude of man, *Vend.* 4, 24). Betrothal is followed by *Divo* when a lamp is lit in the morning and the woman of two families interchange visits and gifts and the dowry presented by the bride's father is presented to the groom's family. Then led by a procession, the groom reaches the bride's house where he is welcomed by his mother-in-law with a *kumkum* (saffron) mark on his forehead and he is lifted over the threshold without touching it, which is also observed by the bride when for the first time she comes to her husband's house. The marriage must be celebrated before an assembly of 5 persons who have been invited for the purpose. The bride and the bridegroom are asked whether they consent to be united in wedlock. Then the hands of bride and her affiancé are joined (*bāthvaro*—hand fastening), a symbol of their union. Frank incense is thrown into the fire by the priests and the bride and the bridegroom throw to each other a few grains of rice which they have held in their left hands. The one that throws the rice first is to win and love the most. This is again repeated at midnight, which indicates that according to Strabo in the beginning of vernal equinox, midnight was the marriage time.

of the Iranians. Next of kin marriage (*xvaetvandatta*, *Yas* 12, 9) was the Iranian custom. Ahura Mazda united with his daughter Spenta Armait (*Yas* 45, 5), and gave birth to Yama and his twin sister Yema who gave birth to first human pair Masye and Masyasi. Cambyses married his own sister. Parysatis urged her son Artaxerxes Longimanus to wed his sister Atossa, to whom her own brother later offered marriage. Bactrian satrap Sysimithres married his mother, and Teritachmes his sister. Sassania Kavap married his daughter Sambyke. It was not confined to the loyalty. Marital relations with mother, daughter or sister were general among the Iranians. The children from union of mother and son were regarded particularly well born. Lithuanians and ancient Prussians permitted marriage between all relatives, except mother and son, even between step-mother and step son. In Purānas marriages with *pitri-kanyas*, that is, with step-sisters, are found. Ancient Slavs had two kinds of marriage, marriage by capture belonging to another tribe and by purchase. In S. Russia the wedding guests engage in symbolical fights; a survival of the ancient marriage by capture. Then companions of bridegroom violently attack the house of the bride while her kinsfolk defend it and repel the aggressors. At last the two parties come to terms. The deputy of the bridegroom (*djevar*) negotiate with the bride's father concerning the conditions of marriage and the fix the date of wedding ceremony. On the wedding day the bride is crowned with a floral wreath. The bride and the bridegroom clasp firmly their right hands, and pass three times round the hearth. The pair gives each other presents as rings and wedding shirts. Afterwards the bride is veiled and conducted in a procession to the house of the bridegroom where she is welcomed, and various fruits, millet, hops, rice (now a days sweets) are thrown at her to express the wish that she may bear many children. She is carried over the threshold and seated on a fur, and a child is placed on her lap. Bread and honey, flowers and sweets are distributed to guests. Slavic *djevar* - Skt. *devara*.

6.—MEDICINE

Caraka and **Susruta Samhitās** are the two important medical treatises of the Hindus. Caraka according to traditions attended to the delivery of Kanishka's queen (about 78 A.D.). Caraka is a compilation based on the 8 tantras (doctrines) of Agnivesa, a fellow student of Bhela, followers of the school of Punarvasu Atreya who had a high reputation for medical teaching at Takshashila in fifth century B. C. Atreya's famous disciple was Jivaka, a grandson and physician of Bimbisara of Rajagriha and of Gautama Buddha. Dridhabala, a physician of the Pancanada, son of Kapilabala of 8th century, revised Caraka's text and added the last two chapters and supplemented 17 out of 28 chapters of *Oikitsāsthāna*. An Arabic translation of Caraka was made about 800 A. D. Caraka deals with (1) *Sutrasthāna*—the principles of medicine, diet and duties of a physician; (2) *Nidānasthāna*—etiology of principal 8 diseases; (3) *Vimānasthāna*—pathology; (4) *Sarirasthāna*—anatomy and embryology; (5) *Indriyasthāna*—diagnosis and prognosis; (6) *Oikitsasthāna*—medical treatment; (7-8) *Kalpa* and *Siddhi sthānas*—therapeutics. No surgical operations are described and mentioned in Caraka Samhitā except laparotomy (6, 18) and extraction of a dead foetus (4, 8). While Caraka mainly deals with the science of life (*Aurveda*), Susruta is especially a treatise on major surgery (*salya*). It does not mention diseases where surgical treatment at that time was not thought necessary. Susruta devotes two (7-8) whole chapters of *Sutrasthāna* to the description of surgical instruments and 25th chapter of *Sutrasthāna* to the principles of surgical operation. Susruta belongs to Kāśi school. Perhaps the surgical school was established by Divodāsa of Kāśi (Kassite dynasty). Divodāsa's name is associated with Dhanvantari who was a Kāśi king, as well as the patron deity Rudra—Sagittarius—the divine healer. Susruta Samhitā contains (1) *Sutrasthāna*—general principles; (2) *Nidānasthāna*—pathology; (3) *Sarirasthāna*—anatomy and embryology; (4) *Oikitsasthāna*—treatment; (5) *Kalpasthāna*—

toxicology. *Uttaratantra*, the supplement, was added by the alchemist Nāgarjuna, perhaps the author of *Rasaratnakara*, of seventh century. Nāgarjuna not only added in the supplement all the minor surgical operations (*sālākya*) as removal of the cataracts of the eyes, which were possibly unknown before, and other diseases which were not mentioned by Susruta. The fame of Nāgarjuna spread to Cambodia in ninth century and in Arabia in 10th century. In Bader Manuscript, found at Kashgar, of about 4th century A.D. Susruta is found mentioned with Bhela, and Atreya which perhaps included Caraka as he belonged to that school. It mentions that the use of garlic (*lacuna*) prolongs life. It enumerates many medicinal oils, decoctions, eye salves, eye-washes, elixirs and aphrodisiacs, and treatment for children's diseases. Vāgbhata, son of Simhagupta, grandson of Vāgbhata, a disciple of Buddhist of Avalokita, wrote *Astanga Samgraha*. The Chinese pilgrim Itsing who resided ten years (675-685) in Nālanda University in his *Record of Buddhist Practices* says that "eight arts (branches of medicine) formerly existed in 8 books, but lately a man epitomized them and made them into one bundle (book); all physicians in five parts of India practise according to this book. So it seems that Vāgbhata who summarized the eight branches of medicine into one book (*Astangasangraha*) lived only a few years before Itsing, if not he was his contemporary. Mādhavakara, son of Indukara, wrote his famous pathology (*Nidāna*) as *Rugviniscaya*. Mādhava cites Vāgbhata by name (*Siddhiyoga*, 1, 27) and quotes him anonymously (*Nidāna*, 2, 23). That shows that Mādhava Kara was posterior to Vāgbhata. Vijaya Rakshita (1240 A.D.) in his commentary (*Madhukosa*) on Mādhava's *Nidāna*—notices several passages of Caraka *Samhitā* which are different from the Kashmir recension (*Kashmiri patha*) of Caraka, revised by Dridhabala. This shows that at Mādhava's time Dridhabala's revision of the Caraka text was not known, and Dridhabala is posterior to Mādhava. Bhagavata II *Astanga Rikaya Sambita* is mainly based on his ancestor. But in *Astanga Rikaya*, citations are formed from Nāgarjuna's *Uttaratantra* of Susruta and Dridhabala's revised edition of Caraka. Aruna Datta (1220) in his commentary *Sarvāṅga Sundarī* on *Astanga* mentions that in the treatment

of chronic diarrhea the summary of *Dridhabala* from *Astāṅga Samgraha* has been summarized again. *Cakrapānidatta* (1060 A. D.) in his *Cikitsāsāra Samgraha* and *Caraka Tatparya Tika* mentions often of *Vrinda* (*Mādhava*). *Vācaspati* (1260) on his note *Atanka Darpana* (mirror of disease) on *Nidāna* mentions *Vijaya Rakshit's* *Madhukosa* and states that his father *Prāmada* was the chief physician of *Mahamada Hammira* (*Amir Muhammad*—*Mohamad Ghori* who ruled Delhi from 1193—1206). *Dallana* commented on *Susruta* in his *Nibandha samgraha* and he quotes *Cakrapānidatta*, and is quoted by *Vachaspati* and *Hemadri*. *Bhāskara Bhatta* (1000 A. D.) wrote an anatomical work *Harirapadmini*, based on *Susruta* and *Bhāgbhatta I*. *Sarangadhara's* work was commented upon by *Vopadeva*, son of physician *Kesava*, and protege of *Hemadri* (1803). *Sarangadhara* prescribes the uses of opium which is of Persian origin; of quicksilver, and pulse in diagnosis. *Nityanātha* (1300) wrote *Rasaratnakara*. *Bhava Misa's* (1561) *Bhāvaprakāsa* (diagnosis) is a valuable work in which syphilis is mentioned as a *Firingi Roga* (*Frank's Disease*). *Surapala* wrote on plant physiology and diseases (*Vrikshayurveda*). *Dhanvantari Nighantu* is an old medical dictionary; it mentions however the uses of mercury. *Suresvara* (1675) wrote *Siddhapradipa* for *Bhimapala* of *Pala* dynasty. *Narahari* (1335—50) wrote *Rajanighantu*, and *Madana-Pala*, *Madanavinseda Nighantu*. A work on dietetics *Pathya-pathyanighantu* is also mentioned. Arab writers also mention *Sanak* (*Cānskyā*) as the author of a medical treatise. *Jivaka* (*Vinaya Mahāvagga*) was possibly the greatest physician and surgeon of antiquity. *Jivaka* was the son of *Abhaya* of *Rājagriha* through the courtesan *Salāvatt*. *Abhaya*, a son of *Bumbisara* by another courtesan, *Ambāpālī*, adopted him, knowing not it was his own child. *Jivaka* went to *Taksasila* (*Taxila*) to learn medicine from *Pingala Atreya*. After finishing his studies for 7 years on his way back *Jivaka* halted at *Saketa*. There he heard that the wife of a banker had been suffering from frightful headache for last 12 years and no treatment was of any advantage to her, and she gave up all kinds of medicines and did not allow any physician come near her. *Jivaka* overcame her reluctance by assuring her that she could make any payment she liked after her recovery. She said, you are still

a boy; what can you do. Jivaka replied. Mother, learning is not dependent on age; one is not wise, because he is old. I believe, I shall be able to relieve you if not, you; do not need to pay me a copper. "Believing that she would take no risks, she allowed Jivaka in her presence. He asked the patient the nature of her suffering. She described the manner and symptoms of her pains. Then, asked Jivaka, "how did your affection commence". She detailed the preliminary development and course of her headache for these years. Jivaka poured a medicated oil (medicine fried in butter) into her nose. The oil came out at the patient's mouth, mixed with saliva, with the result that the patient by the removal of all obstruction felt relieved and was cured. But when the lady collected the ejected oil and asked her maids to use it as a fuel for her lamps, Jivaka thought that he might be miserably paid for his service by that miserly woman. But though the banker's wife hated any kind of waste, her prudential economy was outmatched by her generosity. She gave Jivaka 16000 Karsapanas, many slaves, chariots and horses. Jivaka with these precious gifts hastened home and gave them all to Abhaya in grateful recognition of the protection and affection he had shown towards him. "Father, you have taken care of me with great tenderness and affection, please accept these as a slight return for them. Abhaya already knowing that Jivaka was his own son asked him to stay with him. A rich banker of Rajagriha was suffering from strangulation of his intestine. He could not eat or drink anything because of the occlusion. Emaciation was complete and cachexia was menacing the patient's life. People gave him up as a hopeless case, and his relatives were making funeral preparation for him. Yet Jivaka undertook the case. He had everybody removed from the patient's room, except his wife. He removed all the clothing of the patient and spread a sheet of cloth over his body. He covered the eyes of the patient with pillows so that he could not see anything. Then taking a sharp knife split the integuments of the abdomen and showed the patient's wife how they had become knotted (a volvulus) and in a moment placed everything in proper position and sutured the abdominal incision. He rubbed an ointment upon the incised parts. He then removed the pillows

from his eyes and put him in a restful position in the bed. He then ordered an oatmeal drink. In 3 days the patient was up. The cicatrix was so solid that hair grew in the line of suture which could not be distinguished from the surrounding skin. He was paid 5000 Karsāpāna for this splendid laparotomy. He took the money to his preceptor Pingala Atreya who reluctantly accepted it. A banker's daughter was semi-conscious. Her parents thought her incurable. Jivaka with his Bhaṣajyārāja lighted up the inside of her head (suspected that in her brain) there were worms (thrombus from later sinus). Jivaka through the perforation by trephining the skull removed the thrombus, fixed the bones in their place with sutures, and ordered the patient complete rest and quiet for 10 days. The patient was cured. In the performance of gymnastic exercise the boy of a householder of Benares fell from a wooden horse and thereby displaced his liver, provoking very difficult breathing. Jivaka with his Bhaṣajyārāja diagnosed the cause. With a knife he opened the abdomen, replaced the liver in its proper place and then sutured the wound. Bimbisara was suffering from anal fistula which soiled his garments and made him ridiculous before his subjects. Jivaka with an ointment cured him. Abhira (Avar) ruler Canda Pradyota of Ujjaini, ally of Bimbisara, was suffering from jaundice which none of his physicians could cure; hearing the great reputation of Jivaka, Pradyota requested his friend Bimbisara to send Jivaka to Ujjaini. Jivaka cured Pradyota. And Pradyota was unwilling to part with Jivaka. Jivaka with a speed horse escaped. Learning this Pradyota sent his minister Kaka in pursuit of Jivaka. Jivaka offered to share with Kaka a mango and water. Jivaka managed to put within the half of mango a strong purgative and Kaka had violent evacuations. Kaka implored Jivaka's help. Jivaka assured him that three days complete rest would cure him. In the meantime Jivaka escaped. In a difficult delivery case Jivaka saved the life of a woman by a caesarean operation. A banker of Rajagriha was suffering from piercing headaches for seven years, as if cut by sharp knives. The patient said that he was willing to give up all his possessions to him if he was cured, and even was willing to be his slave. Jivaka asked him if he was ready to remain

in bed for seven successive months on his right side, on the left side for seven other months, and on the back seven months longer. The patient agreed. Jivaka opened the skull, extracted two animalcules (thrombosis), closed the skull, sutured the skin and covered the incision with plaster. After a week the patient complained that he could no longer bear lying on the same side. Lie on the other then, said Jivaka. A week later the patient again complained. "Lie then on your back". The patient again complained. Jivaka then said "My dear Sir, if I had not told you that you would be obliged to remain in bed for 21 months, you would not have remained there so many days. That is the reason, I took precaution, knowing you would be cured in 3 weeks. Sākya (Saka) Gautama Buddha was also suffering from constipation. Jivaka cured him by a snuff, and he became the physician of the Sanga. A piece of stone hurled by Devadatta struck Buddha's foot and caused a suppurating wound. Jivaka incised the wound, drained away the pus, and cured him. Being a specialist in children's diseases, Jivaka was known as Kaumara Bhṛitya (pediatrician). At Jivaka's request Buddha enjoined upon monks to take daily exercise. The diseases according to Caraka and Susruta are due to intolerance of Vāyu, Pitta and Kapha (metabolic diseases) and when the bodily natural immunizing and resisting power is weakened, by the invasion of the body by minute pathogenic germs. "Many of the germs are found in the feces, bronchial secretion and in blood (Sus. Ut. 54, 3; Caraka mentions that germs are found from the birth (sahaja) and in the dirty accumulation in the body = malaja). They are not visible (Sus. Ut. 54, 11). If the germs are invisible, how could they be known without microscopes which are only recent inventions? Arunadatta in his Astāṅga Hṛidaya Tikā (Nidana 14, 51) says, "the existence of some of these germs can only be indirectly established from the effects that are visible though the germs themselves cannot be directly seen on account of their minuteness. Not only the germs engender diseases, they are contagious. Leprosy, fevers, tuberculosis, ophthalmia and other malignant diseases are communicated from one person to another; the contagion being communicated through sexual intercourse, cutaneous contact, inhalation, sleeping on the same

bed, eating and drinking from the same vessel, or through using the dress, salves, and garlands of flowers previously used by the infected person (*Sus. Nid* 5, 26; *Caraka Vimana*, 7, 11). Dalhana (in his note on *Sus.* 1, 6, 20) says that coryza and bronchial infections spread through air and enter human body through nose, while the smallpox through the abrasion of skins. Even MBh (*Santi*, 15, 20) says, "It is impossible to live without taking other lives, for as a rule the stronger live at the expense of the weaker. The world is so full of minute organisms, that inspite of our unwillingness, hundreds of lives are destroyed even in the natural proces of winking, because they are so small that their existence can only be inferred." A good anatomical knowledge, especially of the bones, was obtained by direct personal observation. *Susruta* (*Sarira*, 5, 49-56) recommends the examination of adult dead bodies by medical students, parts by parts, beginning with the skin. *Caraka* however mentions 300 bones, *Susruta* 800, while modern anatomists only 200. The difference arises from the fact that *Caraka* and *Susruta* counted not only teeth, teeth sockets and nails as bones but also processes and protuberances as separate bones. And also for the sake of uniformity, the existence of a third joint in the thumb and great toe was assumed.

FOUR EXTREMITIES

1. Phalanges	56	Joints of fingers	56	Anguli	60
2. Metacarpus	20	Long bones	20	Tala (salaka)	20
3. Carpus, Tarsus	80	Clusters	30	Kurca (adhistāna)	30
4. Tarsus (os calcis)		Heel bone		Parani	2
5. Radius, ulna	4	Fore arm	4	Aratni	4
6. Stylloid processes		Wrist bones		Manika	4
7. Olecranon		Ulna process		Kurpara (Kapālika)	2
8. Tibia, Fibula	4	Leg		Jangha	4
9. Malleoli		Ankle bones		Gulpha	2(C,4)
10. Patella	2	Knee caps		Janu	2
11. Humerus	2	Arm		Bahu	2
12. Femur	2	Thigh		Uru	2

HEAD AND NECK

1. Cervix		Neck bones	Griva	9(K 15)
Vertebrae	7		Prushiti	
Thoracic Vertebrae		Transverse processes	Sthalaka	2
2. Trachae		Bronchi, windpipe	Kantha nāri	4(C jetral
3. Cranium	8			
Frontal	1	Superciliary ridges, brows	Lalāta (C)	
Parietal	2			
Occipital	8	Panshaped bones	4 Sira Kapāla	6(04)
Occipital	1			
Temporal	2		Sankha	2
Sphenoid	1			
Ethmoid	1			
4. Sup. Maxillary	1	Jaws	2 Hanu	2(08)
Inf. Maxillary	1			
5. Malar	2	Cheek bones	2 Ganda	2
6. Nasal	2	Nose	2 Nasa	3(cartilages 1)
7. Lachrymal	2			
In. Turbanetad	2			
Vomer	1			
Hyoid	1			
		Teeth	Danta	32
		Sockets of teeth	Ulukhala	C 32
		Nails	Nakha	82C 20
		Eye balls	Akshikosa	2
		Ears	Karna	2
80				66, 111

TRUNK

1. Clavicle	2	Collar bone	Aksaka	2
2. Scapula	2	Shoulder blade	Amsaja	2
3. Thorax	24	Ribs	Parsapa	72
		sockets - sthalaka, 24	Arbuda	24
4. Sternum	1	Breastbone	Urus 8 (C 10)	
5. Vertebrae	17	Thoracic & Lumbar	Prishha 30 processes	13

6. Sacrum	1 Pelvis	Trika	1
7. Coccyx	1 "	Guda	
8. Ilium,	2 Ischium	2 Nitamba	2
	Pubic arch	Bhaga	1
		121, Caraka	188
		Susruta	870 ; Caraka 860

200

Hindu medical works consist of Salya—Major Surgery ; Sālākya—Minor Surgery ; Kāya-Cikitsā—Medical Treatment ; Bhūta-vidyā—Psychiatry ; Kanmāra-bhṛitya—Pediatry ; Agadatantra—Toxicology, Antidotes to poisons ; Rasāyana—Chemistry of alterative tonics ; Vājīkaraṇa-Tantra—Chemistry of aphrodisiacs (Susruta 1,1,3). Among the surgical instruments mentioned by Susruta (1,8), the following may be identified. Mandal-agra—a circular razor ; Kara-patra—a saw ; Vṛiddhi-patra—a curved scalpel ; Mudrika—thumb-lancet ; Utpala-patra—a knife in the size and shape of lotus leaf ; Ardha-dharan—a lancet with the sharp edge on one side ; Suci—needle ; Kuca-patra—a thin long bladed knife like the leaf of a Kuca grass, Saccharum spontaneum ; Atimukha—a scissor shaped like the beak of Pardus Ginginianus ; Sarari-mukha—a scissor with the blades like the long beaks of Sarari bird ; Antar-mukha—semicircular scissors with straight inside cutting blades ; Trikurcaka—a three bladed trocar ; Kutharika—axe-shaped gum lancet ; Vrihi-mukha—a trocar in the shape of a wheat grain ; Ara—awl ; Vetasapatram—a long bladed trocar ; Vadiśa—a sharp pointed bent instrument like that of a fish hook ; Danta-sanku—dental forceps for extracting teeth ; Netra and Vasti—pipes, nozzles of syringes and douches. Probes, directors, sounds, bougies, catheters, ear and vaginal specula were also used. In the Bhoja Prabandha by Ballala, it is mentioned that Bhoja had been suffering from excruciating pain in his head ; his surgeons recommended operation ; he was made insensible by Sammohini—an anaesthetic ; his skull was trephined ; a tumour was removed, the opening was closed and stitched, and a healing balm was applied on the wound ; then for the restoration of consciousness, Sanjivani, a stimulant, was given.

Huato, author of Ching Tsang Ching, about 250 A.D. produced anaesthesia by certain kind of wine. Surgical instruments number 101 of which in hand is the most important, for without its dexterous handling, no surgical operation is possible. Surgical instruments are the only means of removing any foreign bodies that may be embedded (as arrow heads) or develop within the body (as tumors). Instruments are of six classes as Svastika (forceps) of 24 kinds; Sandamsa (teethed forceps) of two kinds; Tala yantras (saws) of two kinds; Nadi yantras (specula) of 20 kinds; Salakas (probes and bougies) of 23 kinds; Upayantras (surgical accessories) of 25 kinds. These instruments are all made of iron, which may be substituted for any other metal where iron is unavailable (*Susruta*, 1, 7,). Co-ordinating centres of consciousness are in the brain (*Caraka*, 1, 17, 5). Sweet, sour, salty, pungent, bitter and astringent are the taste sensations (*Caraka*, 1, 26, 12). If heart is wounded, one loses consciousness; death takes place if heart is pierced. For heart contains the life principle. In heart are situated vitality and consciousness. Ten main arteries (*dhamani*) spread out from the heart. These arteries carry the vital fluid from the heart to all parts of the body. And all animals thus being vitalized live (*Caraka*, 1, 30, 2-3). *Dhamanias* are blood (*sonita*) carrying (*Caraka*, 2, 2, 67). Heart, the great circulator (*mahasrota*) is the source of life-bearing circulation. The Brain and the Pancreas regulate lymph flow and glandular secretions (*udaka*). The blood vascular system forms a completely closely circle through which the plasma is pumped by the heart continuously in one direction. The lymphatic system begins as blind ended capillaries which unite finally to pour their contents into the venous system. So there is no circulation of lymph like blood, but only movement. The heart with its ten main arteries is the source of plasma circulation. The liver and the spleen are source of *sonita*—erythrocytes (*Caraka* 2, 6, 4). So *Caraka* came very near to the discovery of the circulation of blood. The lymph chyle (*rasa*) is formed as an essence of assimilated food. All the tissues of the body are nourished by it. Then it flows with the heart (through the venous system). From the heart through 24 arterial branches, it (becoming blood) reaches the

remotest parts and extremities of the body. The lymph chyle being coloured (through the mixture of red blood corpuscles) obtains the name of blood. The chyle thus produces blood. From blood is formed flesh (*Susruta* 1, 14). Chyle (*rasa*) is creamy fluid taken up by the lacteals from intestines during digestion ; it is conveyed by the thoracic duct to the left sub-clavian vein where it becomes mixed with the blood. Lymph is a clear yellowish or light straw-coloured fluid, resembling chyle in chemical composition, but containing less fibrinogen and fat, which circulates in the lymph spaces. The bodies necessary for the nutrition of the tissues pass from the blood into the lymph, and the tissues deliver water, salts and products of metabolism to the lymph. In all higher mammals blood consists of the fluid plasma in which are suspended corpuscles of various kinds, adopted for special purposes. Plasma is nearly but not quite colourless and is clear, unless a meal containing fat has recently been eaten, when the plasma is somewhat milky, because of the minute globules of fat which it transports. In anaemia it may be also milky. The plasma is composed of water 90 p. c. ; proteins (fibrinogen) 9% ; salts 0.9% ; sugar, urea, uric acid, traces. Water is present to dissolve other substances and to give the blood fluidity sufficient to secure its easy propulsion through the minute capillaries. Soluble protein is the chemical basis of all cell life. Fibrinogen protein confers on blood the power of clotting. Sodium chloride in blood serves primarily to dissolve the protein. Endocrine glandular secretions in the blood stimulate different cellular activities. The primary object of the red blood corpuscle is that of an oxygen transporter, and its efficiency depends upon the quantity of hæmoglobin it contains. The average number of red corpuscles in man is 5,000,000 per c. c. of blood. The average weight of hæmoglobin in the corpuscle is 0.18 gram and the average amount of oxygen what these will transport is .185 cu. cm. This is more than 50 times the quantity which could be dissolved in a c. c. of blood in its passage through the lung in the absence of hæmoglobin. In the embryo red corpuscles are formed in the blood vessels. About halfway through embryonic life in that mammal these nucleated ancestors disappear from the general circulation and

are found only in the *spleen*, the liver and bone marrow, and at a later stage the bone marrow is the sole normal breeding ground for red blood corpuscles. In an adult human being there are about 5 liters of blood. The liver and the spleen act as the purifiers of blood. The spleen produces leucocytes and is the source of iron metabolism. The liver is the source of oja (glycogen) which is found in all organs (*Susruta* 1, 15), and which is energy producing. The imbalance of Vāyu, Pitta and Kapha (*Caraka* 1, 1, 29; *Susruta* 1, 21) provokes all kinds of diseases. *Susruta* (1, 14) added however the vitiated blood as a fourth factor in the genesis of diseases. Hippocrates 460 B. C. of Cos thought that the derangement of the blood, bile, yellow black bile and phlegm caused diseases. The source of the bile is the liver, of the phlegm the head, of the water the spleen. It seems that Diogenes (483 B. C.) of Appolonia promulgated pneumatic theory of medicine. He ascribed to air the intellectual qualities (archelao). He knew the pulses and the blood vessels by means of which the air is distributed over the body. Early in the 4th Century the heart was conceived as the seat of intellect and innate heat. Polybas, son-in-law of Hippocrates, in the beginning of the 4th century B.C. elaborated the theory of four humors (blood, yellow bile, black bile, phlegm), combined with four qualities (wet, hot, dry, cold) and the four seasons. Erasistratos of Alexandria (304-257), pupil of Metrodoros, son-in-law of Aristotle, discarded the humoral theory and substituted for it the doctrine that the arteries are filled with air (vital spirit). But he believed that every organ is connected with the rest of the body with threefold system of vessels - artery, vein and nerve; and the ramification of arteries and veins were connected, and he found chyloferous vessels in the mesentery. Mithradates Eupator of Sinople in 132 B. C. tried to produce immunity from poison by the administration of gradually increased doses of it. Asclepiades of Prussia, but practising at Rome, born 124 B. C. substituted humoral pathology by the theory that disease is a disturbance in the abnormal movements of the atoms which constitute the body; and in their normal movements of health. *Caraka* (78 A. D.) says the same thing: Sariravayavāstu paramanu bhedenā pāra samkhyaya bhavanti tesham samyoga vāyu karanam. Pien Chiao (c 430

B. O.) of Chihil in his Nanching described the diagnosis of diseases through the rate and volume of pulses. Herophilos of Alexandria under Ptolemy I about 308 ~~and~~ olepsydra to measure pulse frequency to diagnose fevers. He found that the strength of the pulse indicates that of the heart. Prāna vāyu (Susruta 1, 42, 4; Caraka 1, 28, 2) represents the sensory nerves, regulating mind, cardiac and respiratory functions. Udāna vāyu regulates the speech centre. Samāna vāyu=sympathetic abdominal nerve plexuses, regulating digestion and absorption of ingested food. Apān vāyu removes the metabolic wastes and excretory products. Vyāna vāyu=vasomotor function. Pācaka pitta (Caraka 1, 12, 15) represents the digestive enzymes as ptyalin, pepsin, trypsin etc. Vrajaka pitta regulates the body temperature (dehāgni), sebaceous and sweat secretions. Ranjaka pitta activates the bone marrow to produce erythrocytes. Sādhaka pitta is the suprarenal that raises blood pressure, increasing courage and energy. Abalambaka Kapha (Susruta 1, 21, 15) = lymph. Kledaka kapha = mucous secretion. Bodhaka kapha = taste buds on the tongue. Schlesaka kapha = lubricating fat between the bone joints. Trarpaka kapha = cerebro-spinal fluid and tear glands. The importance of the liver, the source of the bile (pitta) for the assimilation of the foodstuffs and for the physiological composition of the blood is evident from the fact that the blood coming from the digestive tract, laden with absorbed bodies, has to circulate through the liver before it is pumped by the heart through different organs and tissues. The liver is a detoxicating organ. In the liver certain ammonia combinations turn into urea; certain products of putrefaction in the intestine, such as phenols, may be converted into relatively harmless ethereal sulphuric acids. The injection of Alloxan, an oxidation of uric acid provokes diabetes which may be controlled by insulin; microscopic examination shows certain changes in ~~cells~~ cells of kidney, and particularly in the Islets of Langerhans which produce insulin. It seems therefore that the accumulation of Alloxan in the system due to insufficiency of hepatic functioning brings out the degeneration of the Islets of Langerhans and provoke diabetes. The bile, the secretion of the liver, discharged into the duodenum assists in the emulsification of fats, increases peristalsis and retards putrefaction. The

liver synthesizes monosaccharides in other muscle cells into glycogen which can be deposited within its cells as a reserve food to be retransformed into glucose in of bodily needs and supplied to the various organs by blood, or converted into fat. Kapha is the secretory-functioning of the salivary, gastric and pancreatic glands. Of course the endocrine secretion of the pancreas—insulin—was not understood, nor of any other hormone of any endocrine gland. So Kapha type meant good digestion; Pitta type meant good assimilation and excretion of the kidney. It has been found out that pernicious anaemia is caused by the insufficiency of gastric hydrochloric acid secretion which acting on the proteins of the food produces a substance which is stored in the liver and carried to the bone-marrow for the production of red blood corpuscles. That is the reason the of liver proves beneficial in anemias. Caraka in the treatment of diseases laid more emphasis on diet than on medicine. Caraka prescribed meat and milk diet in tuberculosis. Beef is beneficial in overwork, tuberculosis and consumption. Of all foods, meat is the most stimulating and nourishing (1, 27). Sparrow, chicken and peacock meat and eggs are aphrodisiacs (8, 2, 20). Meat is the best medicine in tuberculosis (8, 93-110). While Caraka mentions that semen (8, 2, 20) of animals may be orally given as an aphrodisiac, Susruta recommends the testicles of goats, cocks and sparrows. Dammapada Atthakatha (2, 8), a Ceylonese legendary book of about 6th century A.D. mention a plague like disease in which the fleas die first, afterwards in regular orders, insects, rats, mice, domestic fowls, swine, cattle, slaves and then the family members; and only those family members that break down the walls and flee to save their lives are safe. Father, mother and daughter thus escaped, but father and mother (who possibly were infected) died.

Dislocations of joints, simple and compound fractures (Bhanga) were set, bandaged with lint or plastered; and if union of the fractured bones did not take place, the limbs were amputated (Susruta 1, 16; Sarira 9); grafting of the skin and rhinoplastic operations including the insertion of pipes into the nostrils to facilitate respiration was common (Susruta 1, 16); the false presentations of limbs of the babes (mudhagarbham) were set right by hands or by obstetrical

forceps; and in pelvic deformity or narrowness the living baby was extracted from the distressed parturient by an incision made through the abdominal walls and the uterus; the bleeding checked by hæmostatic or cautery; the incisions were sutured and a healing aseptic ointment applied to the incisions (caesarean section: *Susruta Nidana* 8); hydrocele (*mutraja uriddhi*) and abdominal fluid (*udari*) were drained off through catheters; scrofula (*apachi*), goitre (*galaganda*), syphilitic chancre, elephantiasis (*slipadam*), and hernia (*antravridhi*) were removed (*Susruta Nidana*, II-12); bladder gravel (*sar-kara*) and calculi (*asmari*) were treated with alkaline drinks; if the treatment did not dissolve them, they were either crushed or by an incision in the perineum and bladder removed carefully by a forcep (*agravaktra yantra* - with thin curved blades and serrated grasping surface) without leaving any small concretion or any fragment behind; seminal calculus (*sukra asmari*) was also known (*Susruta Nidana* 3; *Oikitsa* 7); abscesses (*vidhradhi*) were opened and drained off, surface tumors (*arvuda*), and internal tumors of (*gulma*) of the intestines, bladder, ovaries and uterus were treated with alkaline mixtures, and if not improved, were operated upon (*Susruta Nidana*, 9, 11; *Oikitsa*, 18; *Uttaratantra*, 42); of 78 kinds (of eye diseases) eleven should be treated with incision operations (*chedya*); 9 with scarification (*lekhya*), 5 with excision (*bhedya*), 15 with venesection (*vyadhya*); 7 admit only palliative measures (*yapya*), while fifteen should be given up by an experienced ophthalmic surgeon (*Susruta Uttaratantram* 8, 13-16); rectal feeding of fluid diet in stomachic troubles through enemas (*vasti*), and oily enemas in constipation were very common (*Susruta Oikitsa* 37). Catheter is used in strangury (*Caraka, Siddhi* 9, 29, 36). Syphilis seems to have been confused with *Kushtam* (leprosy) which affects the bones and destroys the nose (*Susruta, Nidana* 5, 20). *Caraka* (6, 20, 67) describes syphilitic chancre. Gold chloride (*sucarna vasma*) was used as a bactericidal, nervous stimulant and aphrodisiac; silver oxide (*tara*) as an astringent bactericidal; copper oxide (*tāmra vasma*) as taeniocidal and germicidal; *Caraka* (1, 1, 16) regards copper acetate or verdigris as toxic; chloride of iron as a tonic and diuretic in anemia and as a styptic; lead oxide as a

local application in erysipelas, acute eczema and as a wash in leucorrhœa, zinc oxide ointment as an astringent application in eczema and erysipelas (*Susruta, Sutra*, 46). Mercury (pārada) oxide and bichloride of mercury in antiseptic surgical dressing and in indolent ulcers (*Susruta Cikitsa*, 25). In later Aurvedic literature mercury salts, antimony oxide and arsenic sodium were used in small doses as germicidal and tonic. Borax (tangana) as a soothing lotion. *Varahamihir* (527 A. D.) in his *Vrihaḍsamhitā* mentions Iron and Mercury salts as tonic and aphrodisiac. *Cakrapāṇi* (1080 A.D.) mentions the use of black sulphide of mercury (rasaparpati or Kajjali). *Caraka (Sutra)* mentions the use of ox gallstone (*gorochana*), calcined and sublimated gold, silver, copper, lead, iron, lime, red arsenic, salt, chalk and antimony. Bile pigments are not simply excretory waste products. Much of them are retained in varying proportions in the body for the formation of fresh hæmoglobin. As a result of blood destruction which is continually going, iron in simple organic form is liberated by the reticulo-endothelial system and is stored in the spleen, bone-marrow, and the liver to be employed for the formation of new hæmoglobins. About one quarter of the total red blood cells is stored in the spleen as a reserve to be utilized in times of stress as in exercise or in mountaineering in rarefied atmosphere when there is an increased demand for oxygen carrying capacity. Besides iron, the spleen also metabolizes copper which in small quantity is needed for hæmatin. Sulphate of copper, sulphate of iron, realgar, orpiment and sulphur in combination with vegetable drugs are presented for external application in ringworm, eczema and leprosy (*Caraka*, 1, 8, 4). Alkaline caustics (*kshara*) perform scarifications. When reduced to proper consistence, the alkali solution should be removed from fire and ground into an iron jar (*Susruta, Cikitsā* 11, 14). The different varieties of alkalies such as *Javakshāra* (carbonate of potash) for diarrhœa, gravel and stone in the bladder (*Susruta, Sutra* 46). *Romaka salt* (Roman salt, possibly of Alexandria) is easily absorbed, though concentrated (*Susruta Sutra* 46). *Caraka* recommends copper sulphate (*tāmra parpati*) for killing hair lice. *Pedanius Dioscorides*, the military physician of Nero

about 50 A. D. obtained mercury from cinnabar. Kōhung (281-361) asked emperor Yuan in 326 to be sent to Koulon to make cinnabar preparations, to be obtained from Cochin China. Wei Tan invented red ink from cinnabar (mercury sulphide) which was reserved for the imperial of the Han dynasty. In Constantinople it was discovered in 470. Abu Musa Jabir ibn Hai yan al Azdi of Kufa (c 776 : Geber the alchemist) wrote a treatise on the sulphur-mercury theory of geologic metals, the six metals differing essentially because of different proportions of sulphur and mercury in them. The alchemy of the middle age of trying to attempt to convert base metals into gold through mercury amalgam was based on this Jabir's theory, who borrowed it of Taoist alchemy of 300 B.C. in China. Tao Kōhung (281—361 A. D.) wrote three goals of alchemy : (1) preparation of real gold from base metal ; (2) preparation of gold (either actual or artificial with mercury) and mercury salts for rejuvenation ; (3) elixirs made from them Abdul Qasim Maslama ibn Ahmed al Majaite of Cordova, who died in 1007 gives a description as how to make mercuric oxide from mercury. Nāgarjuna in his Rasārṇava (11, 24) describes how to make *Rasakarpura* (colomet). The colomet thus made is free from corrosive sublimate.

The seeds and leaves of *Datura stramonium* (*Dhussura*) were prescribed as antispasmodic in Asthma. *D. stramonium* grows in the temperate regions of the Himalayas from Kashmir to Sikkim. Its alkaloidal content varies from 0.47 to 0.65 p. c. The seeds of *D. fastuosa* (kila and safed Dhaturā) contain only 0.23 p. c., principally of hyoscyamine and hyoscyne in proportion of 2 to 1, and for their narcotic qualities they are for criminal purposes mixed with beer, toddy or sweetmeats. *Ephedra vulgaris* (Sailaja ; Hindi Amsania ; Chinese Ma Huang), a small shrub, grows in the Himalayan regions from Afghanistan to Sikkim from 7800—1200 ft altitude. Its green twigs contain the highest p. c. of the alkaloids ephedrine (1, 50) and d-pseudo-ephedrine (1, 5) ; green stems contain no more than $\frac{1}{4}$ of the green twigs ; the berries, roots, branches or woody stock hardly contain any. Ephedrine and d-pseudo-ephedrine stimulate both the inhibitory and acceleratory mechanisms of the heart. There is a marked blood and pulmonary pressure. The consequent

contraction of the pulmonary arterioles relieves the turgescence of the mucous membrane, and the marked dilatation of the bronchioles relieve paroxysms of bronchitis and asthma. But its sympathetic stimulation inhibit the action of the gut, and consequently it is constipative. Otherwise ephedrine, being effective by oral application, is a great remedy for asthma. Though d-pseudo ephedrine does not increase the blood pressure as high as ephedrine, yet it has the advantage in weak hearts by its stimulating effect on the myocardium. The alkaloid contents of ephedras increase if the plants grow in dryer climates. *E. foliata* growing in the Punjab, Rajputana, Sind and Bombay, contains very little alkaloid. *Sida cordifolia* (*Bala*; growing throughout India) seeds, stems and roots contain ephedrine like alkaloid about 0, 05 p.c. But the seeds contain about 0'32 p. c. *Moringa pterygosperma* (*Sobhan Jana*; Beng. *sajind*) also contains a similar alkaloid. *Pongamia glabra* (*Karanja*) grows from Western Himalayas to Ceylon, especially near the coast. *Karanja* seeds yield about 25 p. c. of a bitter fatty oil (*Pangamol*), containing myristic (0'23, palmitic (8'06), stearic (2, 19, arachidic (4'30), lignoceric (8'22); dihydroxystearic (4'36), linolenic (0'46) linotic (9'72), oleic (61, 30) fatty acids with 8,56 unsaponifiable matter. It also contains an essential oil which raises temporarily slightly blood pressure and slightly relaxes the bronchioles. It is not only recommended in coughs, but also as a cholagogue.

Holarrhena antidysenterica (*kutaja*: its seeds *Indra yava*), a small deciduous tree, grows in arid regions from the Himalayas to Travancore. Its bark contains about 0'22 p. c. and seeds of 0'030 p. c. of alkaloid conessine. It has bitter taste. It kills amoebae in dilutions of 1 in 250,000. By its use marked beneficial results are found in amoebic dysentery. But as its oral application arrests the secretions of ptyalin, pepsin and trypsin, it should be given at least 2½ hours after the meals. Intramuscular injections of conessine is also effective. But it has very little effect in Bacillary Dysentery, through in some cases improvement has been noticed. *Vale-riana Wallichii* (*Tagara*) grows in the Himalaya from Afghanistan to Bhutan at attitudes from 4000—12000 feet. Its root contains the volatile oil which is given in neurosis and epilepsy.

Aconitum heterophyllum (*Ativisha* : 0'40 p. c.), *A. ferox* (*viska* : 0'90) grow in sub-Himalayan regions from Kashmir to Nepal. Its dried roots contain 0'5 p. c. the alkaloid aconitine. It is a respiration poison. But in small doses it lowers and steadies the pulse. It used to be given in hyperpyrexia with congestion of the brain. *Carum copticum* (*yamāni*, Hind. *Ajowan*), *Cuminum cuminum* (*śiraka*) seeds contain thymol which is anthelmintic and intestinal antiseptic. Garlic (*Lasma*) juice was given in dyspepsia and for washing ulcers and abscesses as antiseptic. *Citrus medica* (*jambira*) and *Naranga* (orange) was given for their vitamins to children in scurvy. Beef and chicken were given a tuberculosis; eggs and goat's testicles as aphrodisiacs. The use of *Carophyllus aromaticus* (*lavanga*=cloves), a native of Malacca Islands, camphor (*karpura*) perhaps from Chinese Formosa and Malayas, asafoetida (*Hingu*=gum resin of *Ferula foetida*) from Persia and opium (*abiphena*=Pers. *Asm*) of Persian origin (*Susruta Sutra* 46) indicate that the text of *Susruta* was redacted by Nāgarjuna about 8th century when these drugs were introduced into India, including mercury (*pārada*) by the Arabs. Any way *Susruta* not only shows many surgical operations with wonderful skill, but many valuable drugs as shown above, in the treatment of various diseases. The majority of the remedies was no doubt empirical as their pathology was infantile.

7.—ASTRONOMY

The ancients regarded the Earth a flat surface, full of mountains, hills, valleys, rivers, lakes, rivers, forests, deserts and oceans, covered by the opaque stony sky dome over which rode the sun, the moon, the planets, the stars and constellations. The sky was the heaven in which lived the gods as luminaries. It was a geo-heliocentric universe. For the benefit of the earthly inhabitants and above the Earth they moved in their fixed tracks in a semicircle. *Aryavata* (born in 476 A. D.) for the first time maintains that the Earth is spherical and revolves round its axis in space (*Aryabhatīya*, 4, 9). It is of

course said that Aristarchos of Samos who lived about 280 A. D. taught about the daily rotation of the Earth about the axis and to reconcile the apparent immobility of the fixed stars with the revolution of the earth around the sun, he assumed that the sphere of the fixed stars was relatively much greater than that of the Earth's orbit. But there is no text to support it. And before the time of Polish astronomer Nikolaus Copernicus (1473-1543) it was not accepted by any astronomer. On the other hand we find *Aryabhata* text in a clear unambiguous language. "The sphere of the Earth being quite round, situated in the center of space, in the middle of the circles of asterisms, surrounded by the orbits of the planets, consists of water, earth, heat (interior) and atmosphere (*Gola* ; 1, 6)." "As a man in a boat going forward ~~sees~~ a stationary object moving backward, just so at Lankā (equator of the Earth) a man sees the stationary asterisms moving backward (westward) in a straight line (*Gola* ; 1, 9)." "The Moon being near completes its small orbit in a short time, Saturn being farthest away of all (planets) completes its large orbit in a long time (*Kālakriya* : 1, 13)". Of course the Earth is not completely round like a ball. Its poles are somewhat flattened like an orange. Earth's diameter at the equator is about 27 miles ($\frac{1}{277}$) greater than at the poles. No doubt the internal gravitation of the Earth tends to make it round. But its diurnal rotation causes a centrifugal force that enlarges the equatorial dimension at the expense of the polar diameter. Naturally there is an equatorial bulge. If the Earth were too rigid for the structural modification, the plastic ice and liquid water of the ~~interior~~ would flow to the equatorial regions to compensate the centrifugal force. But due to equatorial bulge, the Earth's pole does not remain fixed but twists around in about 26000 years like the axis of a spinning top. The equatorial belt due to its bulge is turned into the place of the ecliptic by the gravitational pulls of the moon, sun and the planets. As in the ~~case~~ of a spinning top the gravitational action does not succeed to overturn the axis of rotation, and the angle between the spin and the force remains the same, but the axis precesses around, likewise the precession of the equinoxes is caused by the polar twists. North pole 4000 years ago

was at Thuban (Dhruba) in Draco, now at Polaris in Ursa Minor, and at 1400 A. D. it will be at Vega in Cygnus. This equinoctial precessional cycle of 26000 years was called by the Hindus the year of the gods; a man's life's span was but a day of the gods; as a man lives about 72 years and if it be multiplied, 365½ days which constitutes a year, we get practically 26000 years. So the gods' day equal to a man life's longevity was but an allegorical expression for the procession of equinoxes. The procession of equinoxes is a westward motion. If the year were defined as one revolution of the Earth round the sun, then due to procession of equinoxes (*ayanansa* = *krāntipālāgati* at the rate of 50" 9007, given in *Surya Siddhanta*; the present accepted rate is 50".25), the seasons within a few thousand years would be changed beyond recognition. To avoid this difficulty the tropical year is counted from the time of the entrance of the sun in the vernal equinox until the sun has returned there again. This tropical year of 365d. 5h. 48m. 46s, keeps the calendar in conformity with the seasons, but is shorter than the actual, *sideral*, year by about 20 minutes. The Earth moves at the rate of 18.5 miles for second. Solar radiation of light no doubt is the source of habitable temperature on the earth. And its atmosphere acting as a blanket preserves it. Like a screen it transmits the visual light, but withholds the heat-producing infra-red light. On the Moon where there is no atmosphere, the midday temperature exceeds the boiling point of water while the night temperature falls below—240°F. During a lunar eclipse the surface temperature was found to fall within a hour from 160°F to 110°F. Half of the air is contained in the first 3½ miles above the surface, and half of the remainder above 8 miles. At the height of 60 miles the air density does not exceed of one millionth of that of the surface. From the fact that twilight lasts until the sun is 18° below the horizon before it is fully dark, the air is therefore at least 49 miles high. Twilight is due to reflection from air on which the sun is still shining after the sun has set at the surface. The air would have to be to extend up about 49 miles to catch the rays and reflect them down to us. The aurora is electrified and therefore luminous air. The aurora borealis light is reported to have been seen 500 or 600 miles above the earth's surface.

The air is composed of Nitrogen 78.08, Oxygen 20.98, Argon 0.94, Carbon Dioxide 0.03, Hydrogen 0.01, Neon 0.0012, Helium 0.0004, water Vapour 3.01 to 2.5 p.c. Oxygen, Nitrogen screen off the far ultraviolet rays which are lethal to bacteria and may prove injurious to human nervous system. Sun light produces a screen of ozone in combination with 3 atoms of oxygen per molecule, which prevents the penetration of ultraviolet, cosmic and other powerful rays. Meteors move at the velocity of 45 miles per second. A meteoric dust, weighing less than $\frac{1}{1000}$ of a gram, moving at such a speed, would be dangerous to man like a gunshot at a close range. Hundreds of million of meteor showers strike the earth's atmosphere daily. By the atmospheric friction these dangerous meteoric showers are vaporized into harmless gases. But now and then massive meteors strike the earth. The Great Meteor Crater in Arizona, nearly a mile in diameter and nearly 600 feet deep, despite infilling by erosion, has been formed by such a meteoric impact. Small meteorites have been found around the crater but no large ones have been yet discovered. Possibly the meteor exploded by the impact, leaving behind this crater as its evidence. In 1908 a meteor exploded so violently in Siberian Vanovara that the trees were laid flat and a forest was devastated of a distance of 25 miles from the place. The spherical (gola) shape of the earth is conclusively proved by the circular shadow of the earth cast on the moon during the lunar eclipse. The equatorial diameter of the earth is 7,927 miles, the weight in tons is 6 with 21 zeros. Rotating on its axis in 23 hours and 54 minutes it circles the sun at the rate of $18\frac{1}{2}$ miles per second in about 365 $\frac{1}{4}$ days. The seasons vary from the tilt of the earth's axis amounting to about $23\frac{1}{2}^{\circ}$ from the perpendicular.

As the earth's orbit is elliptical and not circular, though the mean distance of the sun is 93 million miles, it varies to the extent of about 3 million miles. But it affects the seasonal changes very little, as the earth is nearer the sun in January, the coldest month, than in July, the hottest month of the year in the northern hemisphere. Earthquake shocks reveal that the crust of the earth covered for $\frac{1}{4}$ of its parts with a thin film of water—oceans—is mainly made of granite about 50 miles thick. The intermediate layer consisting of heavy rocks

extends to the depth of about 2000 miles. The central core, nearly half the diameter of the earth, consists of heaviest molten iron, mixed with a certain extent nickel. The earth's atmosphere extends to the height of 600 miles. But 80 p. c. of the gaseous substances are confined within the 7 miles range of the earth. The earthquakes and tides show that the earth is not only more rigid than steel, but it is also elastic. The tide rising force distorts the earth into an egg like shape by the compression of the circumference. Not only the side of the earth facing the moon is bulged, but the other half opposite to it; if the earth were absolutely rigid, all the tidal effects, would take place in ocean and surface waters. If the earth were elastic without any rigidity, ocean tides would be negligible although the tidal bulge would still exist. The main body of the earth yields to the tidal effects to the extent of 30 p. c. Though being the nearest body the Moon is the most powerful agent for earthly tides; the sun is no less important; it contributes to the extent of 30 p.c. when the sun and the moon are in line as at new or full moon, their tidal forces act together (spring tides). But when they are at right angles to each other as at the first or last quarter of the moon their tidal forces counteract each other (neap tides).

Planets (Gk. *planetes* = wandering) are the wandering stars that change their positions in the sky unlike the rest of the apparent fixed stars of the heaven. They are the Sun (*Surya*), the Moon (*Soma*), Mars (*Mangala*), Mercury (*Budha*), Jupiter (*Brihaspati*), Venus (*Sukra* = sparkling) and Saturn (*Sani*); and after them the days of the week have been named. The sun is the source of our light and heat, and essential to our very existence. Without sunlight there would be no plant life. Coal is nothing but carbonized fossilized compressed plant. The gentle breeze blows in the summer from the sea, for the heavy cooler air rushes in to fill the place of the rapidly ascending sun-heated air of the dry, particularly the desert region. No wonder the ancients worshipped the sun as the greatest god, giver of so many benefits. The sun is a flaming gas ball. It is moving at the rate of 12 miles per second towards the constellations Hercules and Lyra. The sun rotates once in about 25 days at the equator at the rate of 4000 miles per

hour, while the speed of rotation of the earth at the equator is only 1000 miles per hour. At 80° latitude of the sun, it takes $26\frac{1}{2}$ days and at 45° , $27\frac{1}{2}$ days. The sun is about 93 million miles distant from the earth. The sun's diameter (864,000 miles) is about 109 times, the volume 1,300,000, and its mass than that of the earth (diameter 8000 miles). It will take about 1300,000 earths to fill up the empty shell of the sun. The surface temperature of the sun is $10,000^\circ\text{F.}$ and the temperature in the solar interior may be 70 million degrees F. The brilliant surface of the sun is called *photosphere*. Above the photosphere is the *chromosphere*, the red sphere of the sun, with great jets or prominences of incandescent hydrogen and calcium gases, extending to the depth of several thousand miles. This great mass of incandescent gases radiates some 77,000 horse power per square yard of its surface. And the earth receives from it some 643,000 horse power per square mile. If only a part of this immense solar energy could be utilized to the service of man? The sun is spending its mass at the rate of 4 million tons per second. Even at this rate it will take 16 million million years to exhaust it. But the solar energy is being constantly replenished by the disintegration of its atoms from the break up of the electrons from their nuclei as a result of great heat and pressure in the depth of the sun. Great cyclonic funnel shaped vents in the gaseous body of the sun to a depth of 100,000 miles or more in diameter are known as *Sunspots* which appear in cycles of $11\frac{1}{2}$ years with 30° of the sun's equator. Total eclipses of the sun are rare. For total eclipse of the sun is only possible when the earth and the moon run close together, side by side, to cover up the face of the sun. Otherwise it is only partial. If the sun is the most brilliant star of day time, the moon is the most beautiful object of the night sky. It is only 240,000 miles distant from the earth. And it is the only luminary that circles the Earth. And all the phases of the moon from the thin crescent to the full disc are visible to the naked eye. The moon has no light of its own. It shines by the sunlight reflected from its surface. Full moon occurs when the moon is just opposite the sun in the sky. The evening sun reflected in the moon in the eastern sky appears as a full disc. The new moon occurs

when the sun and the moon are on the same side of the Earth. Then the sun-lit half of the moon being on the opposite side of the earth is invisible to it. But as the moon swings in its orbit a couple of days after, a thin crescent is visible. The moon circles round the earth in about $29\frac{1}{2}$ days, a long lunar day and night. Lunar eclipses are only possible at the full moon when the earth moving between the sun and the Moon casts its shadow on the moon. But during the eclipse, earth's shadow in the moon is not entirely black, but bronzed disc, as some of the light from the sun-lit other half of the earth through atmospheric refraction enters with it. On the average moon rises about $50\frac{1}{2}$ m. later each evening than it did in the evening before, because of its eastward motion of about $12^{\circ}6'$ a day around the earth. But in September the full moon rises only a few minutes later each evening; the difference is less and lesser in further northern latitudes, for moon's orbit runs parallel to the horizon. The moon having only $\frac{1}{8}$ of the gravity of the earth has not been able to prevent its light atmospheric gases to escape into the outer space. Without air the moon has no sound. Meteors without being vapourized, by friction of air strike the lunar surface and bury themselves day and night into the ground noiselessly. With no air the sky appears always deep black. It is only through the scattering of short waves of the sunlight in the atmosphere-blanketed earth, our sky looks blue. So brilliant stars can be seen even in lunar day light; without any atmosphere and cloud, there is no softening of light. The landscape is in sharp contrast. The mountains lit by the sun are brilliant, while the valleys in the shadows are shrouded in darkness. There is no twilight. Without the insulation of the atmospheric blanket, the rocky surface becomes unbearably hot (170°F) during the day time and terribly cold at night (260°F). The Earth appears in the lunar sky as a bluish disk, $\frac{1}{4}$ four times the diameter of the moon, observed from the earth. Due to the enveloping thick atmospheric coat, the earth looks hazy without any sharp details. Only the two white polar caps are visible. Equatorial region may appear shining as the curved bulging. Sea water may act as a mirror reflecting the solar rays. Forested tropics may look darkest. Due to low specific gravity of the Moon, volcanic actions on the

moon have been very active. Precipitous lunar mountains reach the altitude of 30,000 ft. (Pico). Lunar craters exceed 30,000 in number. The crater of Copernicus is 56 miles in diameter; its jagged circular wall rises above 12000 ft. and the central cones above 2500. Crater Tycho in the southern region has a diameter of 84. Clavius near Tycho has a diameter 142 miles, almost like a walled plain. But to an observer in the centre of the plain the encircling walls would be below his horizon owing to the sharp curving of the moon due to its small size. Some of the lunar craters were no doubt formed by the volcanic action. The low specific gravity of the moon throws the ejected materials of an eruptive volcano six times as far. The lunar surface is covered with volcanic ash which polarizes light. Without the volcanic ash, moon would have reflected 11 times more light. Streaks of *Rays* that radiate from many lunar craters, especially of Tycho, are possibly due to some whitish powdery materials shot out by the volcanoes. Meteor showers might have formed a number of craters. Earth's atmospheric friction destroys majority of the meteors by vaporization. And the trace of the rest has been lost by geologic erosion and sedimentation. Arizona Meteor Crater is a sufficient testimony what meteor strikings can accomplish. And the specific gravity of the moon is less than $\frac{1}{4}$ of the earth. The lack of atmosphere in the moon is proved by the instantaneous disappearance of a star when occulted by the dark side of the moon. There is no fading or displacement of light which would have taken place if there were an atmosphere by absorption and refraction of rays. Besides distorting the images of stars, the atmosphere absorbs about 30% of incoming light and scatters it in all directions. The moon circles round the earth in 29 d. 12 h. 44 m. 2. 78s, so there are 12.37 *synodic* months. But during that the earth has moved about 30° in its orbit, the true or *sidereal* month, measured with respect to the stars, is 27d. 7h. 43m. 11, 47s. about 2 days shorter. The moon in the meridian is nearly 4000 miles closer than near the horizon. The lunar tides by the friction of the moving waters and consequent loss of energy are slowing down both the earth's rate of rotation and the moon's rate of revolution. And as a result the day is increasing in length by nearly one thousandth

of a second every century. The moon was torn from the materials of the earth during its infancy by its rapid rotation and by solar tides, likely from the Pacific region. And the moon once revolved at a distance of the centre of the earth of only 8000 miles and completed its revolution in 4 hours time. Now even it rotates with the same face to the earth. The tide-raising forces of the Earth have made an elongated bulge along our line of sight by about 3000 feet and have slowed down the moon's rotation, formerly much swifter, so that the rotation period equals the period of revolution about the earth. This has made the moon turn the same side towards the earth. In the same way the moon is slowing down the rotation of the earth. Though the process is very slow a time will come when the moon will have slowed down the earth's spinning so much that the earth also will also turn the same side towards the moon. Then these two bodies will swing as two immovable relatives like two balls of a dumb-bell round the sun, the common centre of their gravity in about 55 days. But the task is finished. The moon is now stable in its old age, lacking water and atmosphere, heavily wrinkled, though radiating soft pleasant light. The highest lunar mountain is about 25000 ft., slightly lower than the Everest, and the deepest crater floor is depressed to 24000 feet, much less than our Great Oceans Deep of 35,400 at Mindanao in the Philippines. Orbital velocity of the moon is only 0.64 miles per second.

Mars is the nearest neighbor of the earth, only 35 million miles distant at the *favourable opposition*, when both the planets are on the same side opposite the sun, at perihelion which takes place every 15 or 17th year. Mars is 140 million miles distant from the sun. It has the diameter of 4215 miles. It rotates in 24 h. 37 m. Its axis is tilted $25\frac{1}{2}^{\circ}$ over from the perpendicular like the earth. Mars has an atmosphere where storm clouds can be observed. But its oxygen content is very low, most of it having combined with surface rocks and oxidizing them. The resulting rusty surface gives Mars warm ruddy light, for which it was regarded as the god of war. The temperature in the equatorial region may reach 50° F day time but at night it falls to 125° below zero. Mars has two satellites Phobos and Deimos. Phobos at

the distance of 4000 miles circles the planet in 7 h. 39 m. Deimos at the distance of 13000 miles takes 30 hours to rotate round Mars. Mars completes his journey round the sun in 687 days. Mars has nearly 60 mile deep atmosphere but there is a dearth of water as revealed by spectroscope. The low specific gravity—100 kilo on earth would weigh on Mars only 88 k—permits a small amount of gas to expand very far there. Oxygen and water vapour being mostly lost through combination with surface rocks, developing a rusty color, only hydrogen and helium gases may have been left which cover the Mars with a hazy atmosphere. The oxygen content of Mars' atmosphere is less than a per cent of the Earth's. Mars lacks mountains. Perhaps as Mars cooled quickly, being smaller in size, its thick crust could not be disturbed by volcanic actions. And its elevations have been levelled down filling up the depressions. Polar caps on Mars which are generally observed in autumn may be of real snow. But snow cannot be very thick. It may be simply a few inch thick frost. Otherwise the sun's heat which is only 40 p.c. of the earth would be incapable of melting a thick glacier. Some of the so called canals of Mars may be old river beds, deeply eroded by the streams they contained. If there is any water left, the water that is evaporated in day time would remain close to these river beds. And frigid night temperatures would remove all water vapour from the atmosphere, leaving only a thin cloud of icicles or a light frost on the ground. Mars has only 0.15 of earth's volume, and 3.11 of its mass. Its density is 5.26. The planets do not twinkle and glitter like stars, because any irregularity in the atmosphere intercepts the course of star's immeasurably thin ray of light from great distances and consequently we do not receive its rays steadily. But though a planet is much smaller than a star, it is million of times closer to us, so a number of rays reaches our eyes and cannot be intercepted by the irregularities of atmosphere to that extent, and therefore their rays appear quite steady to our eyes.

Mercury is the closest planet of the sun at the distance of 36 million miles. Its close proximity to the sun, its small orbit and elongation of 28° make it a difficult object of study, as Mercury can never be observed in full darkness of night. Only for a short while before sun rise or after sun set Mercury can be

observed very low in the sky where vision is blurred by the atmospheric haze. Mercury cannot be seen with naked eyes as frequently as other major planets. But with telescopes it can be studied in full day light with dark glass. Mercury has a diameter of 3100 miles. It has only 0.06 of earth's volume and 0.04 of its mass. Mercury sets about 2 hours after the sun and rises 2 hours before the sun only. Mercury due to the gravitational pull of the sun rotates on its axis with the same face always towards the sun except for minor librations and completes its revolution round the sun in 87.97 days, the velocity varying between 23 and 36 miles per second. For its fastest motion in space, Mercury has been called the messenger of Gods. Synodic period is 115.88 days. As Mercury's only side is exposed to the sun, at perihelion its temperature rises to 770°F. which can melt tin and lead. As no heat can reach the unlighted hemisphere of the Mercury except by conduction through the rocky core, which is a slow process, the other side of Mercury must be extremely cold. Mercury also lacks atmosphere through whose currents hot blasts may be convected. The horns of the crescent of Mercury do not extend beyond their own limits. Any twilight effect of scattering or refraction in an atmosphere would produce an apparent extension of the horns towards the unlighted portion of the disc. The Moon and Mercury show great similarity in their mode of rotation, both being lighted on one side only, lack of atmosphere, density (Moon's 3.8; Mercury's 5.3,) and reflection of light. Mercury has no satellite. Mercury shows different phases like the moon, sometimes like a thin crescent, sometimes a semicircle, depending upon its position relative to the sun. The phases result from Mercury being within the orbit of the earth. Mercury thus can transit the sun, that is, pass between the Earth and the sun, silhouetted against it as a diminutive black dot. If the orbits of Mercury and earth were in exactly the same plane, transits would take place every few months. But Mercury's orbit being somewhat inclined to that of the earth, Mercury usually passes a trifle above or below the Sun. So there were about 18 transits in a century, shortest possible interval between them being $3\frac{1}{2}$ years, and longest 18 years.

Jupiter is the largest of the planets. Though situated at

the distance of 483 million miles from the Earth, it can be seen with the naked eye, shining in *bright silvery* lustre. It can appear at any part of night, and when near opposition, as a spectacular beacon it dominates the midnight heaven. It has the equatorial diameter of 88,740 miles, eleven times that of Earth. 1812 molten Earths would not be sufficient to fill up its empty shell. But in spite of its greater bulk Jupiter spins on its axis in 9h. 55m. at the rate of 8.1 miles per second. Owing to the swift axial rotation equatorial region is carried at the terrible rate of 80 miles per hour, developing exaggerated equatorial bulge, even acting against 2½ times the surface on earth. But it takes about 11.86 years for Jupiter to finish a trip round the sun on its long orbit. Jupiter has a rocky core surrounded by an ice layer 16000 miles thick. Above the ice the atmosphere extends to a height of 6000 miles, consisting of ammonia and methane icicles, as the temperature of the planet is -200° F. Jupiter has 11 satellites of which four are quite large, almost in a straight line as their orbits lie in one plane--Io, Europa, Ganymede, Callisto. Sometimes 2 moons may be seen on one side of Jupiter's disc, sometimes three. Io at the distance from the Jupiter of 262,000 m and diameter of 2470 m, takes 1d. 13h. 38m. to revolve round Jupiter; Europa (dia. 417,000 m; dia. 2060 m) in 3d. 13h. 14s.; Ganymede (dia. 654,000 m, dia. 3580 m. in 7d. 3h. 48 s.; Callisto (dia. 1,194,000; dia. 3360) in 16d. 16h. 32 s.) Jupiter's satellites may be seen to transit. Then its shadow trails like an inky black dot. It may also happen occasionally that all the 4 major Jupiter's satellites may be eclipsed or occulted. The other seven moons are very small. Under 100 miles in diameter; two of them rotate on a retrograde direction in their orbits, opposite to the rest. Density of Jupiter is 1.24 while that of its third satellite Ganymede is only 0.6, consisting probably like the outer layers of the planet, frozen ammonia and methane. Synodic period of Jupiter is 1.092.

Venus is the most dazzling planet of the heaven. It may be as near as 26 million miles to the Earth. But when opposite the earth on the other side of the sun it may be as distant as 160 million miles. The diameter of the Venus is 7700 miles, and it encircles the Sun in its orbit 225 days. Venus is so much

shrouded in a dense envelope of clouds that it is very hard to know of its surface topography. When Venus lies nearly in line between the Earth and the Sun, a faint circle of light is visible as an extension of the crescent completely around the disc. This twilight arc is due to refraction of sunlight through atmospheric deflection. But it acts as an insulator and does not allow much of the hotter solar heat to penetrate to the surface. Venus like Mercury can transit the Sun, but only at intervals of $113\frac{1}{2}$ or $139\frac{1}{2}$ years. The next two transits of Venus will be visible to the naked eye if viewed through a dark glass on June, 8, 2004, and June 6, 2012. Venus like Mercury and the moon present a full cycle of phases. And Venus being situated at the distance of 67 million miles, nearly double that of Mercury, changing phases of Venus night after night can be easily studied and enjoyed with a low magnifying glass. When nearest to the earth only a thin crescent of Venus can be seen. The evening elongation of Venus is succeeded by morning elongation after 144 days when it disappears in the Sun's morning glow. Venus turns on its axis in a month. The temperature of sun-lit side varies from $120-140^{\circ}\text{F}$, of the dark side -9°F . Its sidereal period is 224d. 7h; synodic period 581d. 9h. Venus has an atmosphere of formaldehyde clouds.

Saturn is the furthest of the naked eye planets, situated at the distance of 886 million miles from the Sun. It has an equatorial diameter of 74,100 miles. It has a rocky core of 28,000 miles in diameter, coated with a mantle of carbon dioxide ice, 600 miles thick. There is an atmosphere of ammonia and methane ices, like that of Jupiter. But Saturn has the distinction of solitary grandeur of wearing a golden hued triple ring, with the outside diameter of 171,000 miles from one edge to the opposite, the crumbled particles of a satellite that came too near the gravitational pull of Saturn. The *outer A ring* is 10,000 miles wide; it is separated by at 8,000 miles wide gap which is observed as a fine circular black line from the most luminous *bright B ring* 1600 miles wide; within this is the *orange ring* 11,600 miles wide. Between the orange ring and the surface of Saturn there is a space of about 7000 miles. Saturn has a temperature of -243°F . Saturn has nine moons of which Japetus (half the size of our moon) rotates with same face towards the planet; but during its

rotation one side reflects 5 times more light than the other. The most distant satellite Phoebe revolves in a retrograde orbit of 8 million miles radius. The satellite of Saturn Mimas rotates round the planet in 0.23h; Enceladus in 1d. 9h; Tethys in 1d. 21h; Dione in 2d. 18h; Rhea in 4d. 12h; Titan (diameter 5000m) in 15d. 23h; Temis in 20d. 20h; Hyperion in 21d. 7h; Japetus in 79d. 8h; Phoebe in 350d. 11h. The other three planets—Uranus, Neptune and Pluto—and asteroids, the broken remnants of a planet in the space between Mars and Jupiter were unknown to the ancients, and they are the latest telescopic discoveries. Uranus, situated about 1,782 million miles from the Sun, has a diameter of 32,000 miles, encased in a thick jacket of ice with a dense frozen atmosphere. It rotates in a period of 10½ hours in wrong direction and makes a revolution round the Sun in 84 years. It has a surface temperature of—300°F. Its sphere is flattened by about $\frac{1}{8}$. The axis of the planet and its satellites is tipped over nearly at right angles (98°) to the orbit, so that all the motions are technically retrograde. Its four moons swing around in orbits similarly tipped. Neptune situated at the distance of 2,792 million miles, has a diameter of 31,000 miles, encased in ice and with a shroud of thick atmosphere like Uranus. It rotates in wrong direction in 16½ hours. It has a surface temperature of—830°F. Its one satellite with a diameter of 31000 miles revolves round the planet in 5 days and 21 hours. It requires 165 years to make a circuit round the Sun. Both Uranus and Neptune are flattened at the pole. The satellites of Uranus are Ariel at the distance from the planet of 119,000m. rotating at the period of 2d. 12h. 26m; Umbriel at 116,000m. in 4d. 3h. 28m; Titania at 272,000m. in 8d. 16h. 66m; Oberon at 364,000m. in 13d. 11h. 7m.

Pluto, distanced from the Sun by about 3,680 million miles, makes an eccentric orbital round about the Sun in 249 years. When nearest the Sun Pluto is some 36 million miles within the orbit of Neptune. But as Pluto's orbit is tilted, Pluto and Neptune do not come closer than 240 million miles. Pluto does not seem to have any atmosphere. If there is any it is frozen due to its intense cold. Pluto appears as a faint planet. But its mass is not sufficient to produce deviations in Uranus and Neptune. There may be another planet at the end of the solar

system to account for these deviations. Pluto is a very poor reflector of light. It may consist of iron or black rocks. It has surface temperatures of -348°F . According to Titus Bode's law distance can be computed by doubling 3, as 6, 12, 24, 48, 96 and adding 4 to them, which is actually the case. The Sun is 0. Mercury 384; Venus 7, 2; Earth 10; Mars 15.2; Asteroids 27.7 (Ceres 27.7, diameter 480 miles, revolving round the Sun in 1881 days = $4\frac{1}{2}$ years; Pallas with diameter 300 miles, 26.7; Vesta with diameter 238, 23.6; Juno with diameter 118, 28.7; Cupid's diameter not more than half a mile.)

Asteroids, are found in the large gap between Mars and Jupiter. Asteroids have either been formed out of the fragments of a planet that coming within the gravitational pull of Jupiter broke into pieces; or the gaseous materials failed to condense into one compact mass. More than 1500 asteroids have been found in this gap where ought to have been a planet. These asteroids number possibly 80,000. They vary in size. Some are only 1 mile in diameter. Many may be less. Some asteroids approach the earth very closely. Venus approaches the earth to the range of 26 million miles. But twin asteroid Eros whose brightness fluctuates over a period of $5\frac{1}{2}$ hours comes near the earth by 9 million miles; Apollo 7 million miles; Adonis 1,800,000 miles; Hermes swung to into 400,000 miles only. Nearly a billion meteors strike the earth's atmosphere every day, majority of whom simply leave their trace as tiny and faint darting lights across the telescopic vision. Generally meteors appear at a height of about 75 miles and fade from view at about 50. Beyond the earth's atmosphere they are cold and non-luminous. Tearing into upper atmosphere the meteors become so intensely heated through friction that majority of them burn themselves up and become completely vaporized. Magnesium is usually found in meteors. And magnesium confined in an envelope of compressed air with which meteors plunge headlong burn brilliantly. Meteors travel from 7 to 49 miles per second. Some meteors are large enough to withstand magnesium flare and partial vaporization through atmospheric penetration and they strike at the earth's surface. Some are metallic containing mostly iron, and nickel; others are stony; quite a few are mixed. Ahmighito iron meteorite, found in Greenland by Peary, and brought by him to

New York Museum weighs $36\frac{1}{2}$ tons; Willamette meteorite which fell in Oregon but now in New York Museum weighs $15\frac{1}{2}$ tons. There is a meteor crater in Arizona; another in Odessa, Texas; a group of craters in Australia; one in Estonia; another in Arabia. It is likely that some small asteroids have entered into the orbit of the earth, as leftovers of disintegrated comets. And the earth in its revolution encounters them as showers. Stray or sporadic meteors are known as shooting stars which can be seen any clear night streaking across the heavens. Majority of the comets (numbering about 50) are associated with Jupiter, consisting of fragmented materials from Asteroids. Saturn, Uranus and Neptune have also comet relationship. Comets move in extremely elongated ellipses about the Sun. Comet's head or nucleus is composed of loose aggregation of fragmented asteroids surrounded by a nebulous envelope of gas. When comets approach the Sun near perihelion, radiation pressure from sunlight push away some of the gaseous materials and fine dusts from minute fragments to form the tail, sometimes many million miles long. But as the comet head turns away from the Sun, the tail vanishes. The comet's tail is composed of such diffuse gases and cosmic dusts that stars are visible through them. An entire comet's tail can be squeezed into a frail maiden's handbag to be carried by her. Comets and their disintegrated nuclear materials—meteors—belong to solar system.

The origin of our solar system is shrouded in mystery. Perhaps a star closely passed by or brushed aside our sun. As they quickly swung past at close quarters, by their mutual gravitational pulls great tides were raised in both, and a cigar-shaped gaseous filament was torn from one or both and left behind close to our Sun. As the flaming gaseous star stuff which the Sun and the retreating star have left behind began to condense, by its contraction, the star-stuff separated into possibly 10 or 11 separate masses which formed the planets with the satellites. The central portions, having the largest masses, formed the biggest planets, Jupiter and Saturn. At the ends, small planets like Mercury and Pluto, perhaps another smaller still, which has to be located. Asteroids are possibly the remnants of the fragmented planet that rotated between Mars and Jupiter and by the gravitational pull of Jupiter broke into pieces; or due to the

mutual pulls of Mars and Jupiter did not coalesce into one compact mass. As the flaming balls began to condense, round their nuclei, due to central gravitational effect they began to rotate. The orbits of all planets and their satellites lie practically in the same plane and they rotate on their axes in the same direction about the Sun which indicate their common origin. The similarity of the metallic contents of the Earth and the Sun; the abundance of hydrogen and helium in the Sun and giant planets indicate the solar origin of the planets and account for the low density and structure of Jupiter, Saturn, Uranus and Neptune. Such an encounter or collision of two stars is not a common occurrence in the stellar universe. So the planetary family like our solar system is rare.

According to Aryabhatiya the year = $\frac{1577917500}{432000}$ days = 365. 258 - 365d. 6h. 12m. 29.84 s. According to Hipparchus and Ptolemy the tropical year = 365d. 5h. 55.12. The modern sidereal year is calculated as 365d. 6h. 8m. 46s. and the tropical year is 24 minutes shorter, that is, 365d. 5h. 48m. 46s. So the Hindu calculation was more accurate than that of the Greeks. According to Aryabhatiya the mean synodic month of the moon = $\frac{1577917500}{67753936 \cdot 432000}$ days = 29.530 days. According to Ptolemy 29.530 days. According to modern astronomy the lunar synodic period is 29d. 59; and the sidereal period is 27d. 82. *Latadeva*, the exponent of *Romaka* (Roman, but based on the Greek system and by Greeks themselves) and *Paulisa* (Paulos of Alexandria who wrote an astrological introduction in 378 A. D.) systems was a pupil of Aryabhata. *Latadeva*, according to Alberuni (1, 14), also wrote *Surya Siddhānta*, possibly based on Suse and Assyrian systems. It seems the Roman calculations were also known to the author (1, 6; 12, 89). Suse was a great centre of astronomical studies during Sasanid domination where both the Assyrian and Greek systems were mixed. Though to the Hindu astronomers the Greek system, at last through Roman sources, and possibly Persian and Babylonian systems were known, they synthesized their systems and improved on them. Many Greek words have entered into astronomical and mathematical works of Varāhamihira's *Horāśāstra*: *horā* (Gk. ora -

season; Eng. hour); kendra (kentron=centre); tavuri-Gk. tavros; pathona (pardenos); kriya (kreos); Ara (Ares); hiel (Helias); trikona (Gk. trigonon); lipta=lepte; jāmītra (Gk. diametron); Koti (Gk. Kathetos); harizā (Gk. orizon); pāṛthona (Gk. parthenos); apoklima (Gk. apoklima); hridroga (Gk. udrochoos); Jya (Zeus); Asphajit (Aphrodite). Sulba Sūtras of Baudhāyana Apeastamba deal with the construction of fire altars and their measurements (geometry). With our naked eyes in a clear dark night 14 stars of 1st magnitude, 25 of 2nd m., 68 of 3rd, 840 of 4th, 1015 of 5th m., 3260 of 6th m. are visible. As only half of these is visible in one place, the number of visible stars does not exceed 2260. But as the atmosphere remains generally hazy, stars lower than fourth magnitude cannot be seen, not exceeding 219. But with a powerful telescope over 100 million stars are visible and 1500 million stars can be photographed. Stars are distant blazing suns. Our day star—the sun—is 93 million miles distant from the earth, that is the reason it looks so dazzling. If it were situated at Polaris at the distance of 1086 light years we could not see it but with a telescope. Light travels at the rate of 186,000 miles per second; so in a year it will amount to a about six billion miles. Our nearest star is our sun from which light reaches the earth in $8\frac{1}{2}$ minutes. The nearest star to our solar system is Proxima Centauri in the constellation Centaurus; and it takes about $4\frac{1}{2}$ years for its light to reach the earth; Sirius 8.8; Procyon 10.9; Altair 15.7; Vega 26.5; Pollux 30; Arcturus 38; Castor 44; Aldebaran 57; Regulus 60; Antares 189; Spica 190; Betelgeuse 270; Rigel 540; Canopus 540; Deneb 660; Polaris 1086 years. That is the Polaris we see now left its light 1086 years ago. And even the sun light we enjoy is $8\frac{1}{2}$ minutes old. The colour of the star betrays its surface temperature. Stars with dull redish colour has a low surface temperature of (2600°F) 1400°C, orange red stars of 9000°C about (6,500°F). Yellow light that of our sun has a temperature of 10,000°F. The bluish and whitish stars of about 70,000°F (40,000°C). Stars are called *fixed*, but that is only relatively in comparison with the *wandering* planets. Stars are so far away from us that their movements appear so slow that they may be called almost motionless or fixed. But every

celestial body has its motion though the speeds vary. Though Sirius and Antares move at the rate of 10 miles per second Sirius being situated at the distance of 88 light years and Antares of 160 light years, Antares seems to move slower even in the eyes of delicate astronomical instruments than Sirius though actually they are moving at the same rate.

Our sun with its planetary family is moving towards Hercules at the rate of 12 miles per second. But Betelgeuse crawls slowly at the rate of 7 miles per second while Arcturus rushes madly by a record-breaking speed of 85 miles per second. But may not stars clash in their eccentric runs? There is very little chance. They move by the laws of reciprocal gravitational attractions. And the stars are so distant from each other. And the immensity of space is practically filled with emptiness where the moving bodies are fewer than gold dusts in ocean water. The density of star varies. Our sun has $\frac{1}{4}$ the density of the earth, that is like that of water. While the companion of Sirius, a ninth magnitude star, has 10,000 times the immensity of our sun, and its one cubic inch would weigh a ton, having a density 60,000 of Procyon's one cubic inch which would weigh 200 times that of water. The companion of red star Betelgeuse is composed of such extremely rarefied gas that it is almost like a vacuum. And Betelgeuse has about 400 times the diameter of our sun. Antares has 340 times the diameter of our sun. Vega has a diameter of more the 8 million miles. Arcturus of 20 million miles. Our sun is a 4.85 magnitude star.

Stars are not only single, there are about 20,000 *visual doubles* (about $\frac{1}{10}$), 200 *eclipsing binaries*, *Cepheid variables*, *long period variables*, and many *multiples*. Out of every nine naked eye stars one is a *double*. Sirius of 1.6 has a companion of 8th magnitude whose density is so great that its one tablespoonful would weigh about a ton. *Algol* (Arabic *Al ghul* = demon) in *Persens* is an eclipsing variable. Though it appears to the naked eye to be a single star, but actually there are two stars revolving around their common centre of gravity. The orbit of the two stars is turned edgewise towards the earth. When the brighter component faces the earth, it is a 2.1 star. When the fainter one takes its place within 5 hours, then *Algol* is no brighter than 3.2 star. A binary may develop from a *cepheid* through the

increase of angular velocity brought about by contraction, due to radiation of energy. In 61 Cygnus, a binary at the distance of 10.2 l.y. a planet 61 Cygni seems to be attached. The primary star of 61 Cygni has the visual magnitude 5.37 and the companion of 6.38 and has periodicity of 720 years. In 70 Ophiuchi a binary at the distance of 17 l.y. and the visual magnitudes of the components are 4.3 and 6.0 with a periodicity of 17 years. If the planet be attached to the primary, having a mass of 1.1 of our sun, the mass of the planet would be about 12 times of our Jupiter. If it be attached to the companion which is 0.7 of our sun, the planet will have a mass of 8 times of our Jupiter. But in 70 Ophiuchi the size of the binary's orbit is about 3.5 times that of the planetary orbit, indicating its instability. After 5 hours Algol regains her brightness and shines likewise for 59 hours. The Arabs without understanding this peculiar change of Algol's brightness called it demon with winking eyes. Delta Cepheus varies in its brightness from one day to one or two months. So stars of this type are called short time variables. Mira Ceti at the distance of 23 l.y. gradually rises in brilliance from tenth magnitude to 2nd magnitude in 6 months and then for 3 months Mira is visible to the naked eye, flashing in brilliance 1000 to 1500 times, in a period of 332 days. Mira has a companion. 2000 long period variables of Mira type are known, their periods of brilliancy varying between 100 and 400 days. The longest period variable is Epsilon Auriga near Capella which varies in brilliance from 3.3 to 4.1 in a period of 9900 days—over 27 years, the gradual decrease of light extends over a period of 2 years. The Novae are interesting types of variables; due to collision with a small faint star, explosion takes place in its internal structure causing it suddenly to glow, thus producing the Nova class. In 1934 Nova Hercules, a 14th magnitude star, suddenly burst into the glory of first magnitude. In 1885 a Super Nova appeared in Andromeda nebula with a brilliance of 7.5, about $\frac{1}{10}$ of the whole nebula. In 1901 a Nova suddenly glowed in Perseus. Between 1900 and 1938 six novae have been recorded. There is a Supernova in the satellite spiral of Messier 51 in Canes Venatici; On April 6 (1945) it appeared as a faint star; On April 12, it attained the photographic Maximum of 11.0

There are also dark stars without any glow of light. In 1938 a companion of Epsilon Aurigæ, almost of the diameter of Uranus, invisible to the eye, was photographed by infra-red light. There may be many dark stars like that roving in space. Many apparent binaries are really multiples. **Mizar** (horse) and **Acor** (rider) of Ursa Major were named by the Arabs for testing the eye-sight of their army recruits as a naked eye double. Latter with telescope it was found that Mizar is itself composed of two stars. And each component star is again a spectroscopic binary. Acor is also a spectroscopic binary. So Mizar and Acor really form a star family of six stars. **Polaris** (1085 l. y.), a cepheid variable, is really a quadruple, the main star consisting of 3 components, and the companion, all revolving round the common centre of their gravity. **Castor** (44 l. y) in Gemini is a sextuple; the two main components of Castor are visible in the naked eye, but they being close together, they cannot be separated with an optic glass; but each of the components, and the fainter companion are spectroscopic binaries. **Alpha Centauri** (43 l. y) in Centaurus is a triple, the third component (Proxima Centauri, called so being closer to the earth than the other two) revolve with the other two. **Pleiades** (500 l. y) (*Kirtikā*) in Taurus appears to the naked eye a sextuple moving at the rate of 18 miles per second. But with a good vision in a clear night one may find out 7 to 9 of ten stars. But in a telescope it appears as a galactic cluster of several hundred stars. **Hyades** (120 l. y) in the head of Taurus is another galactic cluster of stars of about 85 light years in diameter. **Præsepe** in Cancer is a galactic cluster of about 300 faint stars. The **Galactic Clusters** about 230 in number with range in diameter 10 to 80 light years, moving at the rate of 18 miles a second, are found in the spherical region of about 500 l. y. in diameter of the Milky Way, not exceeding the distance of 1500 to 10000 l. y. from the earth. **Globular Clusters** found chiefly in Hercules, Ophiuchus, Sagittarius, Centaurus and Argo, having diameter between 100 to 200 l. y, moving at the speed of 60 to 180 miles per second, are situated at the distance from 20,000 to 200,000 l.y-away from the earth. **M 13** in Hercules (38000 l. y.) and **M 2** in Sagittarius, which can be seen even with the naked eye as a faint cloud of light contain more than 100,000 stars of 18th

magnitude. **Omega Centauri** with a diameter of about 100,000 l. y. contain a globular cluster of 19th magnitude. The **Galactic Nebulae** are of three kinds—diffuse, dark and planetary—all within the plane of the Milky Way. The nebulae contain extremely tenuous gases, almost one-millionth of the density of gas of vacuums that can be produced in laboratories. Many of them are visible through the lights of the stars that shine through them. Around the **Theta Orionis**, a faint cloudlike object is visible to the naked eye—the nebula of Orion, ten light year's across at the distance of 800 light years. All diffuse nebulae emit a greenish radiance due to the ionization of oxygen in vacuum. Through this greenish radiance shines the splendid **Theta Orionis**, a trapezium, an irregular quadrilateral of four stars of white, lilac, garnet and reddish in colour, ranging from 8th to 5th mag. **Vell Nebula** in Cygnus is pretty. **Crab Nebula** seems to be expanding, and in it a new star not long ago blazed forth. In Cygnus near δ 1 Cygni there is a dark nebula—**The Sack of Coals**. Close to the Southern Cross in the southern Milky Way there is another dark nebula—**Coal Sack**. Though like the diffuse nebulae, dark nebulae consist of extremely tenuous gases, as these regions contain no stars, they remain dark. The **Dark Lane** in Ophiuchus is 60 l. y. in length and 5 l. y. in breadth. About 150 planetary nebulae are found in the plane of the Milky Way. They are roundish, oval or ring-like, containing in the centre very hot blue stars, emitting greenish blue light. The **Ring Nebula** in Lyra is composed of tenuous gases at the centre of which is a small but exceedingly hot dwarfed blue star and emits almost entirely invisible ultraviolet radiation so energetic that it excites the atoms in the nebulous shell and causes them to emit light in the invisible part of the spectrum. **Milky Way**—our universe—composed of myriads of so many distant stars that to the naked eye their lights melting into each other make a soft radiance. But it is a galactic sphere. The stars we see, nebulae, and our solar system—all belong to this spherical wheel of which the Milky Way is the central back bone. This celestial river—**Akasa Ganga**—is the main artery of our galactic universe. The sun with its planetary family is located at the edge of the Milky Way wheel which contains about 30 to

100 thousand million stars of which our sun is one. The centre of this grindstone centre lies towards Sagittarius, about 88 millions l.y. distant, and it has a diameter of about 100,000 light years, and its revolution round its center takes about 200 million years. Our solar family is moving with it at the rate of 200 miles a second. There are about 89 constellations which include all the stars of the entire sky. Of these, our cosmic grindstone with the Milky Way in its rim, with a diameter of 100,000 l.y. with the center at Sagittarius at the distance of 38,000 l.y. our Sun at one edge, rotating round its centre once in 200 to 250 million years, is not only spiral; but there are other thousands of extragalactic spirals. The **Andromeda Spiral Nebula**, 65000 light years across, situated at the distance of 700,000 l.y. from the earth, contains more than a hundred novae in the hazy central nuclear area while there are numerous stars in the outer Spirals. Andromeda weighs about 9500 million times of our sun. The *Whirlpool Spiral* in Canes Venatici shows its broadside towards the earth which shows its circular form with spiral arms condensed into stars with a nuclear star in the centre. The spiral nebula in Ursa Major is entirely composed of stars. There are hundreds of millions, if not billions of these kinds of extra galactic spiral nebulae, each containing thousands of millions of stars, all rotating round the centres. Those that rotate rapidly have flattened bulge in the equatorial regions. All these spiral nebulae compose our spherical universe with a diameter of 6000 million light years. "This Brahma egg (universe) is hollow (containing vast spaces). It has the form of the sphere. Within this is the orbit of stars (Milky Way Galaxy), wherein revolve the sun, Saturn, Jupiter, Mars, Venus, Mercury and the moon (Surya Siddhanta, 12, 31-32). Some astronomers think that the universe is expanding like a soap bubble, and extra galactic spirals are receding into distance at great speed (nebula in Bootes at the rate of 24,300 miles per second). At such a speed the universe in 1800 million years would double its diameter. And the expansion of the universe could not have begun earlier than 100 million years ago. But the stars are thousand times older than that. And at such a rate of expansion and recession of the galaxies into distance, their speed

would soon exceed that of light, which is contradictory to laws. It is simply an optic illusion due to absorption of light in the spiral nebulae. Of course the universe is curved. The curvature of space has been proved by the observed deflection of light of stars near the solar disc during a total solar eclipse and the shifting of the perihelion point of Mercury. Like space, the radiation of light is also in curve. The ray of light that left the Earth when it was in glowing molten state may come back again to the earth or at least may be observable through telescopes in millions of years after its cosmic round trip has been finished. Likewise too apparent spiral nebulae may be the reflected image of only one. Gradually the mysteries of the universe are being unravelled to the delight of all thinking men.

In *Yajurveda* (Vs. 17, 2; Ts. 4, 40, 11; 7, 2, 20), the following numerical notations are found: 1 (*śka*), 10 (*dasa*), 100 (*sata*), 1000 (*śahasra*), 10,000 (*ayuta*), 100,000 (*niyuta*), 1,000,000 (*prayuta*), 10,000,000 (*arabuda*), 100,000,000 (*nyarabuda*), 1,000,000,000 (*samudra*), 10,000,000,000 (*madhya*), 100,000,000,000 (*anta*) and 1000,000,000,000 (*paradha*). Aryabhata (476) in his *Ganitapada* (3,2) mentions that one (*śka*), (*dasa*), hundred (*sata*), thousand (*śahasra*), ten thousand (*ayuta*) hundred thousand (*niyuta*), million (*prayuta*), ten million (*koti*), hundred million (*arabuda*), thousand million (*vrinda*) are respectively from place to place, each ten times the proceeding". It shows that Aryabhata understood the value of zero. If zero was placed in the front of a number, it increased its value by ten times; but if it was placed behind it, it became one tenth of the number. Thus 0 placed after one = $10 = 1 \times 10$; 01 = $\frac{1}{10}$. Numerals with their decimal place value notations are also found in many copper grant inscriptions as the following. Gurjara grants from Sanhedu (595 A. D.); Belhari inscription of 646 A. D.; Kanheri inscription of 674; Raghali plate of Jayavardhana of 710 in which 30 is given in figures including a zero; Circle plates of Devendravaradhana of 753 in which 20 is given in figures including a zero (*sunya*). Pingala (202 B. C.) in his *Chandah Sutra* (8, 29) also mentions zero (*sunya* = 0) "Divide six by two ($6 \div 2 = 3$); when one is subtracted $3 - 1 = 2$; $2 \div 2 = 1$; $1 - 1 = 0$ then place zero". In Asoka inscriptions (300 B. C.) Brahmi 9 numerals are found all over India.

Severus Sabokhti of Nisibis, bishop of Kanesra, mentions in 862 nine numerals, the value of which he fully appreciated. Gotama Siddhārtha (Clutan Hsiata) translated in Chinese between 713—742 a Sanskrit astrology in which decimal notation is introduced in China. Yakub ibn Tarik, a Persian who lived in Bagdad (767—778) met in 767 at the court of Al Mansur Hindu Kankab (or Manikha) who had brought there the Siddhānta. Yaqub wrote in 777 on sphere and its division of tables derived from the Siddhānta. Md. Ibn Ibrahim Al Fazari was ordered by Caliph Al Mansur in 772 to translate the Sanskrit astronomical work Siddhānta, by which Hindu numerals were introduced. Abu Yusef Al Hindi of Basra who lived in Bagdad (815—842) wrote 4 books on the use of Hindu numerals. Abu Abdallah Md. Musa al Khwarizmi of Khiva who lived in Bagdad 813—883 under Caliph Al Mamun wrote a book on arithmetic on the Hindu system of numeration. The earliest Muslim documents bearing such numerals date from 877 and 881; the earliest Muslim zero as a dot is found in a manuscript dated 878. So Zero is falsely called Arab numeral.

8.—RELIGIOUS FESTIVALS

The Hindu religious festivals are usually associated with the movements of the sun, the moon, the planets and the position of the stars. Every religious minded twice-born (Dvija) Hindu male is to welcome the rising Sun with the vedic Gāyatri prayer and the females by salutation. Likewise the setting Sun is given farewell. The Sun (Surya) is worshipped as Vishnu, as the preserver of life through its light and heat. The earth's entry into 12 zodiac constellations (Samkrānti) in its annual trip around the Sun (regarded as the apparent course of the Sun month by month through the sky) heralds a new festival. When the Earth enters into Pisces on March 21, *Caitra Samkrānti* (Citra=Spica in Virgo is visible from March to October), takes place—the

vernal equinox—and the New Year begins. Two thousand years ago the vernal equinox (when the days and nights are of equal length) took place in Aries (Prajapati), and four thousand years ago in Taurus (Nandi Vrishabha—Apis Bull with white and dark colourings of the ancient Egyptians). To the opposite colour of the Taurus was Sagittarius (Scorpio at that time was regarded as part of Sagittarius), the Vedic God Rudra whose carrier he became. Summer Solstice begins when the day is the longest. And as the day begins to be shorter, it is the *Ratha Jatra* of the Hindus, the Swinging of Vishnu. On September 21, it enters into Virgo, known as autumnal equinox, when a series of festivities commences with the Durgā Puja. Then on December 22 it enters into Sagittarius, when Winter Solstice commences. Two thousand years ago instead of Sagittarius, it was Capricornus (Vedic Aja Ekaped, now known as Makar or crocodile after the Egyptians) for which it is called Makara Samkrānti when sweetmeats are eaten as the Christians eat X'mas cakes. Vishnu is identified with and represented by *Matasya* (Pisces), *Kurma* (Cancer), *Nrisimha* (Leo), *Varaha* (Capreus), *Krishna* (Hercules), and *Balarāma* (Bootes). It is said (8. B.) that a fish prophesied a deluge and told Manu to build a ship for the emergency. Manu built the ship and it was towed safe by the fish and tied to Nambudhana Hill in Kashmere. This deluge story is borrowed from the eleventh tablet of Gilgamesh epic of about 2300 B.C. There the fish god is Ea. Pisces is represented by two fishes, a northern and a western, connected by a ribbon tied in a knot midway between the two by Alpha Piscium (Al Risha), a fine double star, pale green and blue, of mags. 2.4 and 3.9. The head of the western fish is outlined by 5 faint stars forming a regular pentagon. This constellation is important as it is the nidus of the vernal equinox for centuries and will continue so for many centuries to come until replaced by Aquarius. Pisces is visible from sunset to sunrise from September to March, and swinging from the east to the west. Cancer was known to the Babylonians as turtle (—*Kurma*). It is visible from January to July. Its center is Prasepa, the Bee-hive (Pushyā) a naked eye cluster of 363 telescopic stars. Theta Canceri is a triple star of mags. 5, 5½ or 6½. In Hindu legends it is said that Asuras (Assyrians) stole the Jar of Ambrosia from the gods, and they hid

it in ocean waters. So ocean was churned (*Samudra Manthana*) or explored to secure it. Amrita is Surā—possibly the knowledge of making palm wine (toddy) from Bablylonia and Assyria (M.Bh. 1, 18). Saptaratnas (Rv. 5, 1, 5; 6, 74, 1) are mentioned in Hindu and Buddhist literature. These seven jewels or treasures—wheel (*cakra*), car (*Ratha*), pearl (*ratna*), wife (*dharya*), territory (*dhama*) and elephant every Chakravartin should possess. Did these also come from overseas? Possibly the art of diving for pearls was learnt with palm culture and toddy making from the Babylonians and Assyrians.

Aquila (*Garura*) appears in May and disappears in Dec. *Nṛsiṃha* is borrowed from the Khatti bicephalic (having lion and human heads combined) Leo found in Carshemish. Leo is visible from February to September. It is then offerings are made to the Pitris, the ancestral spirits. 4000 years ago Leo marked the Summer Solstice. Alpha Leonis (*Regulus*—*Magha*) is 1.34 star on the heart of the lion at the distance of 93 l. yrs; Denebola (*Aśleshā*), on the tail of the lion is 10 times as bright as our sun at the distance of 25 l. y. Gamma Leonis (*Algeiba*) is a double 2.6 mag. star with a 3.8 mag. companion. *Vāmana* (*Cepheus*) is dwarf and insignificant, yet it is visible from February for 10 months though it contains no 1st, 2nd or 3rd magnitude stars. It is the Egyptian Bes and Gk. Orpheus, the Hindu *Nārada* and *Sarasvatī* who played on the divine harp—the Lyre. Delta Cepheus is a variable pulsating double. The brighter star swells and contracts from 5 to 3.7 mag. in a period of 5d. 8½h. The companion is a fifth mag. blue star. Beta Cephei is a 3rd mag. star with a bluish 8th mag. companion. Mu Cephei is an irregular variable star of a fine deep garnet colour. Xi Cephei is a double star; mags. of components 5 and 6½. Hercules is visible from April to November; when Heronlee is on meridian in September Leo becomes invisible and Hydra head begins to disappear. That is represented in Greek myth as Herakles killing the fierce lion of Nemea and the hundred headed hydra. Hercules also sets his feet on the head of Draco. According to the Hindu myths Krishna was born in Bhādrāstami (in Aug.-Sept.) which is still celebrated, and Krishna defeated *Kāliya Naga* on the *Kālinḍī* (Hydra on the southern Milky Way (and he was a cowherd (Ursa Major and Minor were regarded as cattle). The star cluster

in Hercules M 18 between Eta and Zeta, visible to the naked eye, contains at least 50,000 stars at the distance of 86000 light years. Alpha Hercules is one of the first doubles in the heavens; a 3rd mag. orange star with a blue or green attendant of 8th mag. The Sun is moving towards Hercules and Vega at the rate of 13 miles per second. In Bhādra Samkrānti Hercules is worshipped as Visvakarman, the architect of the universe. Bootes is visible from March. According to the Greek legends Bootes being of an ingenious turn of mind tilled his land successfully by inventing the plow which he hitched to his two oxen and for this he obtained the title of Herdsman or Ox-driver (Arcturus) and was placed in the heavens to follow the stars of Ursa Major which resembles a plow. In Rome Ursa Major was called plowshare and its seven bright stars were called Septentriones=seven plowing oxen; in Greece simply Triones. In Hindu legends Balarāma (Balabhadra), the step-brother of Krishna, always carried a plowshare on his right shoulder which was his fighting weapon for which he was called *Hakayudha*. Alpha Bootes (Arcturus= *Sasti*), 0.21 star of richly golden orange colour, at least 1000 times the size of our sun, situated at the distance of 41 l. y. moves at the rate of 100 miles per second. Epsilon Bootes is a beautiful double star, consisting of a third magnitude yellow and a $8\frac{1}{2}$ mag. blue star. The two oxen, now forming a separate constellation Canes Venatici (hunting dogs= Asterion and Chara), just below the plowshare (Ursa Major) and Arcturus, are harnessed for the plow by Bootes. The collar of Chara is marked by a star Cor Caroli, an attractive double with the delicate colorings of flushed white and lilac. On the head of the Asterion lies the famous whirlpool spiral nebula M51 at the distance of 1,100,000 light years. *Solar and Lunar Eclipses* are observed by the Hindus by fasting and baths. A total eclipse of the Sun is caused by the moon passing between the earth and the sun. As moon is apparently of the same size as the Sun in the heavens, it can cover the Sun from our view. But the long shadow which trails behind the moon along a narrow strip as the earth revolves, and in the region of the shadow, total eclipse is visible. This shadow draws a black streak across the earth which may be as broad as 160 miles and long as 10,000 to 12,000 miles. A partial solar eclipse is visible

about 2,100 miles or in the neighbourly regions of total eclipses. In Hindu astronomy it is said that the eclipse is caused by *Rāhu* and *Kratu* (ascending and descending nodes of the moon), who are included among the nine wandering stars. Ancient Teutons during solar and lunar eclipses used to make a great din to scare away the two wolves—Skoll and Hati—whom they imagined were trying to swallow the Sun and the Moon to bring back darkness to facilitate them to capture their preys.

The Moon's (Soma) diameter is equal to one fourth that of the earth at the short distance of 240,000 miles only. Both Jupiter and Saturn have moons larger than that of earth. When the moon lies between the earth and the sun, and the moon comes above the horizon at the same time as the sun sets with it, it is called the New Moon (*Amavasya*). A couple of days later a slender crescent moon appears to the east of the sun, the horns always pointing the east. The bright crescent is the sun-illuminated portion of the moon. The remaining dimly lighted portion being illuminated by light reflected from the day side of the earth. Its somewhat ruddy colour is caused by the sun light having passed twice through our atmosphere. This crescent becomes a semicircle as the moon moves away from the sun. Semicircular moon becomes oval by the time the moon is behind the earth with the earth between it and the sun. Each day the moon rises about 50 minutes later than on the preceding day. The moon always presents the same side to the earth so that one side of the moon is never seen at all. But due to moon's libration, that is apparent swaying due to the inclination of its axis to its orbit, about $\frac{1}{8}$ of the lunar surface is visible at one time or the other. The repetition of the same phases of lunar illumination varies between $29\frac{1}{2}$ and $29\frac{1}{4}$ days, consisting of a lunar day and night. Lunar grey and dark patches (mare crisium), seen best during the full moon, occasionally with green or yellow tints, possibly due to volcanic weathering of dried ocean beds, covering over $\frac{1}{2}$ of the surface, was regarded as a lunar tree (*Parijata, Soma*) on which dwelt the gods and Pitris and fed on lunar ambrosia which being thus exhausted, the moon became crescent. Gods due to heavy drinking rest for a while and the moon grows again. According to another legend, the moon, the offspring of Surya and his consort Prithivi Matā,

married 27 or 28 star maidens and lived in their mansions during the course of his annual wanderings. But he stays longer with his favourite consort Rohini (Hyades). For his sexual excesses due to his polygyny and his excessive amative sports with Rohini he has contracted tuberculosis. The stars are *Viśākha* (Ar. Zuben el Genubis; Ch. T.), a 3rd mag. star in Libra which was in ancient times a part of Virgo, visible in the morning in the east from March and in the Western sky up to October; from this star the first month *Vaiśāka* is calculated. *Anurādhā* (Ar. Akrah = Ch. Fang), Beta Scorpionis, a binary of 2nd and 4 mag; *Jyēṣṭha* (Antares = rival of Ares or Mars for its magnificent reddish colour; nearly twenty five million times large as our sun but having the luminosity of only 4000 suns, at the distance of 860 l. y.; 1. 32 mag. a fiery red binary with a 7th mag. tiny companion, for which in Vedic times it was called *Viśvarūpa*, later it became a part of Sagittarius or Rudra. It is seen in the morning of May to rise in the east and disappear in the west in November. From this star *Jaiṣṭha* is calculated); *Mūla* = Lambda Scorpionis, a binary of 2nd and 3rd mag); *Āṣāḍha* = Epsilon Sagittari = Kans Australia = Ar. An-Noaim = Chinese Teu, the western side of the Milky Way, a 2nd mag. star; it is visible on the western sky from June and the morning sky upto Dec. from which the month is called *Āṣāḍha*; Messier 8 near the Milky Way is a star cluster containing millions of stars, possibly the heart of the Milky Way galaxy; *Śrāvaṇa* = Alpha Aquilae = Altair = Ch. Nu. 0.89 mag. star, situated at the distance of 16 l. y. having the luminosity of our 9.2 suns, appears in the eastern sky in the middle of June and disappear in eastern sky in January, from this star in Aquila = Garuda—the month is called *Brāhmaṇa*; *Śrāviṣṭhā* is either Alpha Delphini (*Śvalocin*) in Delphinus (*Vasus*), the Chinese and Arabs however identify it with Beta Aquarii, (*Sadalundi*); *Satabhiṣaj* is Alpha Aquarii (*Sadalmelek*); *Purva* and *Uttara Bhādrapada* are Alpha Pegasi (*Merkab*) and Gamma Pegasi (*Algenib*); Arabs however identify U. Bhādrapada with Alpha Andromedae (*Alpheratz*); *Merkab* is visible in the morning sky of August and disappears from the western sky in February; from *Merkab* the month *Bhādra* has been named: *Revati* = Alpha Piscium = Okda, a fine double star, pale green and blue, mag. 2.8 and 3.9; *Āṣvini*, = Alpha Arietis =

Homal, appears in the eastern sky in September and disappears in the western sky in March ; after Aśvinī, the month Aśvina has been named ; Bharaṇī = Bet Arietis = Bharatam, both in Aries who as an ass, instead of lamb with golden fleece as in Gk. myths represented Prajāpati, Egyp. Amen ; Kṛttikā = Eta Tauri = Pleiades, a beautiful naked eye cluster of 6 or 7 stars ; Aleyona, the brightest of 3rd mag. appears in the eastern horizon in early September and disappears in the western sky in Mars, after whom the month Kārtikā has been named ; Rohini = a cluster of 5 stars in the face of Taurus ; Mrigashira = Alpha Orion is Betelgeux (the armpit), a red giant with more than 300 times the diameter of the sun, and luminosity of 1200 suns at the distance 9200 l.y. one of the youngest of the stars, appears in November in the eastern sky and disappears in western sky in June ; after it Aśvayana has been named ; Adrā = Gamma Orionis, a 2nd mag. star ; Punarvasu = Alpha and Beta Gemino-rum = Castor and Pollux ; Pushya = M 44 Cancri = Praesepe, a naked eye cluster of 363 telescopic stars, appears in the western sky in January and disappears in the eastern sky in June ; after this Bee Hive-cluster Pausa month has been named ; Aśleshā = Alpha Hydræ = Alphard (Cor Hydræ) ; Maghā = Alpha Leonis = Regulus (Cor Leonis) 1.84 mag triple star with 8½ mag. binary companion, of indigo colour, the royal star of the Achaemenides, situated at the distance of 56 l.y. having the luminosity of our 56 suns, appears in the morning sky in February, is in meridian on Aug. 21, and disappears from the western horizon in September ; from this star the month of Māgha has been named ; Purva Phālguni = Delta Leonis = Zosma ; Uttara Phālguni = Beta Leonis = Denebola in the tail of Leo, at the distance of 26 l.y. and ten times as bright as our sun, from which the name of the month of Phālguna has been derived as it rises a month later ; Hastā = Delta Corvi = Algorab, a binary of 3rd mag. yellow with an 8½ mag. companion ; Citrā = Alpha Virginis = Spica, the brilliant white star shining on the ear of barley of Virgo at the distance of 330 l.y. with the glow of our 1500 suns, appears on the eastern horizon in the middle of March in the morning, when Gemini and Orion are on the meridian ; in October it disappears from the eastern horizon ; when Sagittarius and Ophiuchus remain in meridian, Svati = Alpha Bootis = Arcturus of

orange gold colour, Abhijit—Alpha Lyrae—Vega, the delicate blue star, 4th brightest, shining with the glow of our 50 suns, appear in September in the western horizon at midnight, are on the meridian in December and in March disappear from the eastern sky. But due to precession of the equinoxes, Vega will be the polar star in about 1200 years from now. Brahma Hridaya—Alpha Aurigæ—Capella, a binary revolving around, at the distance of 24 l. y., their common centre of gravity in 101.2 days, its cream white light deepened by pinkish glow, with the brilliance of 185 suns, appears in December on the horizon and disappears in June. Tishyā—Alpha Canis Majoris—Sirius—1.68 mag. the brightest star in heaven, having a companion of 8.4 mag. situated at the distance of 8.6 l. y., and the brilliance of our 27.3 suns, but its companion radiating ~~red~~ light of our sun appears on the western horizon in December and disappears in June. Prabhāsa—Alpha Canis Minoris—Procyon appears in the western horizon in January and disappears in July, a 0.48 mag. blue-white binary, situated at the distance of 10.4 l. y. having the brilliance of $2\frac{1}{2}$ sun and its 17 mag. companion of only $\frac{1}{1000}$ of our sun. Agastya—Alpha Argus—Canopus, 0.88 mag., situated at the distance of 204 l. y. appears in the western sky in Dec. and disappears in June. The 28 Hindu lunar mansions are quite similar to that of the Chinese *Sieu* or determinants and Arab *mansāḥ*. Twenty four of them were fixed by the Chinese about 2100 when vernal equinox took place in Pleiades (Mao) and they headed the list with Mao (*Kirtaka*). Cheukong in 1100 B. C. added four to them as Kusi—Pushyā—Præsepe, Kio—Citrā—Spica, Ten—Asara (= Kane Australia, and Koei—Revati, but the Chinese and Arabs identified it with Alpheratz in Andromeda. The only other differences are in Sing—Magha which the Hindus and Arabs identified with Regulus, but the Chinese with Delta Hydre. And Chang with Theta Hydre while the Hindus and Arabs with Delta Leonis; and Y which the Chinese identified with Alpha Crateris—while the Hindus, and Arabs with Delta Leonis; Kang which the Chinese identified with Virginis—Zabigava while the Hindus with Arcturus—Svati about 20° north of ecliptic. Nu the Chinese identified with Eta Aquarii while the Hindus and Arabs with Altair; Nien which the Chinese and Arabs identified with Alpha

Capricorn—Secunda Gudi while the Hindus identified it (Abhijit) with Vega, nearly 34° north of the ecliptic; and Hin which the Chinese and Arabs identified with Beta Aquarii = Sadalsud, but the Hindus with Sravisthā = Svalocina in Delphinus. It seems that the Hindus borrowed it from the Chinese and transmitted the knowledge to the Arabs, who rectified their mistakes after the Greeks. The Hindu Svati = Arcturus, Abhijit = Vega, Sravana = Altair and Sravisthā = Svalocin are 12°, 20°, 28°, 34° north respectively of the ecliptic. Of course these stars are found mentioned in Av. 19, 7; Ts. 4, 4, 10. But Ts (4, 4, 10) locates them differently. The presiding deity of Kirtikā (Pleiades) is Agni (here Taurus = Vriśha is perhaps identified with Ara); of Rohini (Hyades) is Prajāpati (perhaps the name of Rada, whose bearer is Taurus); of Andrā = Gamma Orionis is Rudra (here Orion and Sagittarius are made the same); of Tishya = Sirius is Brihaspati (Jupiter made to preside over Canis Major); Asrera = Alpheratz is Hydra; of Maghā (Regulus) is Pitarā = Leo; of Phālgunī (Zosma + Denebola) is Aryaman (Cepheus, mistaken for Leo); of Hastā (Algorab) is Sāvitrī (Corvus); of Citrā = Spica is Indra as lord of his consort and Indrāni = Virgo; of Svāti = Arcturus is Vāyo; Viśākhā = Zuben el Genuchi is Indra (Libra in ancient times formed a part of Virgo); of Anurādhā = Akab is Mitra (Scorpio in ancient times formed a part Sagittarius, and Mitra presided over the ecliptic from winter solstice to vernal equinox); of Rohini = Jyestha = Antares is Indra (for Rudra); of Asrera (rain is Aquarius as a presiding deity of water—Apah); of Sravisthā is Vāsu (Delphinus); Satabhisā = Sadalmelik is Indra (Aquarius; but Indra is the presiding deity from vernal equinox to summer solstice); of Prasthā pādas = Bhādra = (Mars is Aja Ekaped Capricornus; perhaps Prothopāda is star in Capricornus, and wrongly identified by commentators with Bhādrapada; of Apabharani = Alpha Persei = Mirfāc is Yama (Perseus).

Yāmi (Andromeda) tried to seduce his twin brother Yama (Perseus) to sexual unions (which Yama did not think proper (Rv. X, 10, 1-14). But according to Zend Avesta Yima and Yimeh are the first human pair from whom the human race originated. According to Gk. legend Andromeda was chained to a rock by his father Cepheus to be devoured by Cetus (Abi Budhna), but

Persus hastened to her on the flying horse Pegasus (Asvins) with a gleaming raised shining sword in one hand and holding in the other the decapitated head of Gorgon Medusa; he thrust the monster Cetus deep below the waves and rescued fair Andromeda and married her. Yama became a great god. Later he became the guardian of ancestors, and consequently of the dead. He had two dogs (Canis Major and Canis Minor) on both sides of the Milky Way to guard the path way of the dead. The brilliant star Alpheratz on the head of Andromeda appears on the eastern horizon in September and disappears from the western horizon in March. Persus appears in November and disappears in May. Canis Minor (Procyon) appears in January and disappears in June. Canis Major (Sirius) appears in December and disappears in June. Sirrah (Alpheratz) is in the head of Andromeda at the northeast corner of Pegasus. Just above Mirach, the star on the girdle is Pi, a double star, composed of 4th and 8th mag. And above it is the Great Nebula, M3, having a diameter of 100,000 l. y., containing millions of stars, a spiral, visible to the naked eye, at the distance of 935 l. y., approaching us at the rate of 300 km. per second. The orange star Alnath (G) on her foot is a magnificent triple star composed of an orange 3rd mag., blue 5th mag. and sea green 6th mag. Mirfak is in the armpit of Persus, and Eta Persi, a yellow 4th mag. star with a blue attendant of 8½ mag. in his raised gleaming sword; Algol, the winking *demon star*, varying in mag. in 2d. 20h.46m. from 2½ mag. for 8½ days and declining to 3.6 mag. in 8½h., and remaining at that for 18 or 20 m. in another 8½ hours it regains its former brilliance. Algol is about 1 million miles in diameter with a mass less than half of our sun and its dimly lighted companion about 800,000 m. in diameter at the distance of 3 million miles. Each time the dimly-lighted companion passes between Algol and the earth, ¾ of lights of Algol is cut off, and it appears to blink, which caused terror to the Arabs and the Hindus. Rudra (Sagittarius) was a fierce fighter with his bows. In ancient times Sagittarius and Scorpio were combined. As Taurus (Vrisha) is in opposite culture of Scorpio, Taurus (Nandi Vrisha) became the bearer of Rudra (Vrisha-Vahana). As Ophiuchus (Bhujangadhara) is the

adjacent constellation, both became identified with each other. And Virgo, (Kumārī; Gauri for her white star Spica), the queen of heaven, being their nearest neighbor, became the wife of Bhujangadhara, the great god (*Mañḍava*), and the mother (*Umā*) of *Ganeśa* (*Aldebaran*), *Kārtika* (*Pleiades*) and *Rohini* (—*Ushā*—*Hyades*). Gemini (*Mithuna*), in opposite colure to Sagittarius, is Hara (*Ophiuchus*) and *Pārvatī* (*Virgo*) in eternal copulation. Crater is the Cup of Wine of Virgo (*Madālāsā*). Antares, 1.22 mag. fiery red binary with 7th mag. green companion, having the brilliance of our 4000 suns at the distance of 880 l.y. appears on the eastern horizon in May, and Sagittarius disappears from the horizon in February (*Siva Caturdasi*). Sagittarius is a centaur armed with drawn bow and arrow (*Sagitta*—*Dansantari*). Being armed with arrows and having flaming red star, no doubt Rudra became rival (*Antares*) of war-god Mars (*Maruts*). *Ophiuchus*, the *Serpent Bearer* (*Bhujanga dhara*), holding firmly the serpent coils round his shoulder and waist, appears on the horizon in June and disappears in January. It is the *Æsculapius* of the Greeks, the divine healer (*Viśakā*). Alpha Ophiuchi—*Ras-al-hague*—a second magnitude star, shines from the brow of *Ophiuchus* (*trineśra*). Delta Ophiuchi (*Yed*) appears as an eye of *Ophiuchus*, and 89 Ophiuchi, a 5½ mag. orange star with a 6 mag. blue companion. There is a dark s-shaped nebula in *Ophiuchus*. Leo (*Simha*) appears on the eastern horizon in August and its heart *Regulus* (*Maghā*) in the beginning of September. Virgo appears in the beginning in eastern horizon. So Virgo (*Durgā*) is said to come riding on the lion (*Simharathā*). In autumnal equinox Spica, its brilliant white star, is on the ear of barley held in her hand. The yellow 8rd mag. being *Vindemiatrix* (grape gatherers), with a tiny companion of deep red colour, having a period of 185 years, rises just before the sun in grape gathering season of October, for which she is thus named. Gamma Virginis is a fine binary of 3½ mag. of 180 years period. Theta Virginis is a four mag. binary with a 9th mag. companion. Near by is the Crater (cup—goblet). It was the drinking cup of Virgo (*Madālāsā*). The Greeks regarded it as the goblet of *Bacchus*. When the full moon enters into Virgo, *Lakshmi Puja* is celebrated, when the new moon

enters into in a fortnight, it is the festival of lights (*Dipānyāsa* or *Dipali*). And the New Year is calculated by many. On this dark night Virgo is worshipped as *Kālī*. When the crescent moon appears a couple of days later, exchange of gifts takes place between brothers and sisters, and brothers are given feasts by their sisters, wishing them long life and prosperity (*Bhāratī-dvitiyā*). Taurus appears in November and disappears in June. Bulls are worshipped in India as the representative of Taurus, the bearer of Sagittarius (*Rudra Siva*). With the appearance of Pleiades Kartika is worshipped, as the son of Siva and Umā, and the commander-in-chief of the divine army (*Deva Senā*). Only six or seven stars of the Pleiades are visible to the naked eye, but nearly 4000 more are revealed which gives the appearance of nebulosity in the vicinity of each star. Sappho sang: "The moon and seven Pleiades have set; it is midnight; the hours go by; still I am lying in my bed alone". Aratos, the Greek poet of 3rd century B. C. mentions Alcyons, Merope, Calceos, Taygeta, Asterope, Electra and Maia. Now six are visible. It seems Maia has been lost through dimming. The Pleiades are physically connected stars, all moving through space southwards together with the same speed and in the same direction like a flock of wild birds. Alpha Tauri—Aldebaran 1.06 mag. the 14th brightest in heaven, is situated at the distance of 28 l.y. having the brilliance of 45 suns. It is the flaming red eye of the Bull, with a 11th mag. attendant. Before 2100 B. C. In ancient Egypt, when Taurus marked the vernal equinox, the appearance of redish Aldebaran was celebrated with the sprinkling of red powder and joyous festivities and hilarities. And Aldebaran had several temples. Possibly the Holi festival of the Hindus, the May Day, and the Easter are the the survivals of the ancient spring festival in honour of Aldebaran. Aldebaran is represented by Ganesa (Janus) in Hindu myths. Ganesa is vermillion-hued like Aldebaran, and his elephant tusk teeth are the horns of the bull seen in the opposite direction. Vinayaka worship and Brata take place in February when Aldebaran is in meridian at midnight. Beta Tauri is on the horn of the Bull. M. I. Tauri is the Crab Nebula. Hyades is Ushā of the Hindus and the five sisters,

Phyto, Ambrosia, Eudoria, Corona and Polyxos of the Greeks. It is said that Prājapati (Orion) being enamoured of his daughter Ushā (adjacent constellations. Possibly Hyades. Hyades at that time formed a separate star group, and not included in Taurus) followed her. And she changed herself into a female deer—Rohini (Taurus; that is formed of a part of Taurus, which might have been in ancient times classified as a deer). At this Rudra (Sagittarius in the opposite colure) being incensed at the father pairing with his own daughter aimed his arrows at him (A4 Br. 8. 33). When the father desiring copulation united with his youthful (daughter) in passionate ardour he discharged into the pleasure receptacle of her yoni a good deal of semen which overflowed (or spring showers: X. 51, 6). Hyades means rain in Greek. Hesiod in his Work and Days says: When Pleiades, Hyades and Orion set (spring), it is time to plow again, but not to go to the sea. In the Greek legend it is said that Artemis (Sagittarius) aimed her arrows at Orion, a handsome hunter as he attempted to rape Eos, the dawn maiden and changed Eos into a deer, because she was bathing naked. In November with the dawn Hyades disappears from the eastern sky, followed by Orion. Orion (Prājapati) appears in the western horizon in November and disappears from the eastern sky in May. The arrow shots of Rudra Prājapati in the western sky represent the Belt of the Orion. Mintaka (Delta Orionis) is a pretty binary of 2nd and 7th mag. in white and pale violet; Alnilak (Zeta) is topaz yellow, light purple and gray of 2nd, 6th and 10th mag. Sigma Orionis below Alnilak is composed of an exquisite group of pretty stars of various colours of 4, 10, 7½ or 7 magnitudes. Meissaīrā—Betelgeux; Adra—Gamma Orionis: Bellatrix. Beta Orion is—Blaa rājā, situated at the distance of 450 l. y. luminosity of our 18000 suns, is on the foot of the Orion. Exactly below the middle star of the Belt of Orion is the swordhandle. The sword is adorned with three stars, the central one appearing like an eye in tears. But it is not a star, only the beautiful Dark Horse Nebula, covering the central part of Orion. It is said that Agni (Ara) had no wife. He seduced six of the wives of Saptarshi (Ursa Major), except Arundhati, consort of Vasistha. These six wives were afraid

to return to their husbands. So they appealed to Kārtika. Kārtika placed them in Hyades. Ara (Fire Altar) just below Scorpio rises in the earth's horizon in June, is in a meridian in August, disappears in the eastern horizon in September. Ara is situated on the Milky way. Alpha, Beta, Gamma and Zeta Ara are 3rd magnitude stars. Epsilon and Theta Ara are of 4th mag. 861, 8675, 8575. 864, 456, 3650, 3840 are nebulae. Saptarshis are (Sat. Br. 2, 1, 2, 4) are represented in Ursa Major: Dubhe (Dhruva) = Kratu; Marak - Pulaha; Phaed - Pulasta; Magrez = Angiras; Alioth - Atri; Mizar, and Alcor - Pasistha and his consort Grundhati; Benetnash = Marichi, all 2nd mag. stars. Zeta Ursa Majoris is a binary of 2nd or 4th mag. in the middle of the Great Bear's tail. Ursa Major is visible in the eastern sky in December and it disappears in the western sky in September. Ursa Minor is visible throughout the whole year. Ursa Minor is important for Alpha Ursa Minoris (Polaris) is the Pole Star. Polaris is a 2nd mag. star with a 9th mag. bluish attendant, the primary component of which is a variable triple star. About 2200 B. C. the polar star was Thuban (Dhruva) in the tail of Draco. The Hindu husbands still show their brides to Dhruva star and tell them to be firm and fixed like that. As due to precession of equinoxes, Thuban has given place to Polaris as the polar star, in 11500 years time, in the same way, the polar star will be Vega in Lyra. Draco is our Manasa, Vedic golden shining Ahi. The Dragon's eyes, represented by stars Alwaid and Etanip, are ever watchful and they never set below the horizon of northern Greece. Draco bends his coils towards Cepheus and then in a long sinuous curve separates the Bears by its tail. Draco appears in March in the east, is in meridian in August and disappears in November in the west. Draco becomes dominant in August when Manasa Puja takes place. Sarasvati (Perseus) rides over Hamsa (Cygnus) on Akasa Ganga (Milky Way) and plays on Vinā (Lyra). Perseus appears on the eastern horizon in October, is in meridian in February and disappears in April. Sarasvati Puja takes place, when Perseus and Cygnus are in meridian. In the tail of the swan there is the blue-white first magnitude star Deneb, 10,000 times as brilliant as our Sun at the distance of 650 light years. Beta Cygni is a binary of 3. 2 and 5. 4 mag.

of orange and blue colours. 61 Cygni is a binary at the distance of 1091 years. Chi Cygni is a long period variable of red colour. For 6 months it is invisible sinking to 13.5 mag. Then it rises in brilliance varying from 6.6 to 4 mag. It has a period of 406 days. Between the Alpha, Gamma and Epsilon Cygni is the Coal Sack possibly formed of a black nebula, or it is the black intergalactic space through which no star shines. According to Hindu Myths Garuda (Aquila) has stolen the Jar of Ambrosia of the gods (Aquarius). As Aquarius lacks any first or second magnitude stars, for religious ceremonies, Altair, a first magnitude 0.89 star, situated at the distance of 16 l. y. and luminosity of our 9.2 suns and approaching the earth at the rate of 20 miles a second, has taken its place. Aquila (Suzna = Eagle) of the Romans, and double-headed eagle of the Khattis, is the Garuda Dhruva (standard) of Vishnu. Asius (Pegasus) rises in the eastern sky in August, is in meridian in October and disappears in February. Asius heralds the spring and consequently of health. Asius is the winged horse of Indra. Asius poured fourth from their hoops a hundred jars of wine (Rv. 1,117,7). In Greek legends, Pegasus was the winged horse of the gods, particularly it brought quickly Perseus to rescue Andromeda from the monster Cetus. At the spot where Pegasus kicked, a fountain called Hippocrene (horse-spring) gushed forth which was the inspiring fount of the Muses. The three wheels and felines (Rv. 1,118,1) of Asius' golden car are Markab (Alpha), Scheal (Beta), and Algenib (Gamma), forming a square with Alpheratz of Andromeda. Enif (Epsilon) is a wide double of 2.5 and 3.5 mag of yellow and violet colours. Indra (Centaurus) crushed Vritra (Hydra) for which act he is praised in the sacred literature, and is called Vritrahana. Hydra, the water-snake stretches over nearly quarter of the sky between Centaurus, Argo Navo, Virgo, Leo and Cancer. Its many hooded heads lie under Cancer. Hydra appears in February. Centaurus appears in June, is in meridian in July and disappears in September. Soon after Centaurus appears and becomes dominant. Above the head of Centaurus is the tail of Hydra, and Virgo—the queen of the heaven, Indra's consort—Indrani. Virgo's Spica shines above Hydra's tail. Above the Hydra's heart shines the orange hued binary Alpherd

(Or Hydra) of 2nd magnitude, having a companion of a pale shade of green. The head of the reptile also contains a binary of 4th and 8th mag. of yellow and purple colours. 27 Hydrae is planetary nebula of slightly elliptical shape, resembling Jupiter. Nearly 400 stars of Hydra are visible to the naked eye. *Indra* transfixes *Varaha* (Lupus) on the west by his thunder-bolt. Its brightest star Alpha Centauri of 0.33 mag. the nearest naked eye star, being situated only at the distance of 4.3 light years, has the speed of 20 miles per second and having the brilliance of our 1.3 suns. It is a binary, composed of 8.8 and 1.7 mag. period 8 years. Beta Centauri, its close neighbour, is also 0.83 mag. star, but situated however at the distance of 800 l. y. and has the brilliance of our 3600 suns. Proxima Centauri which is closer still than Alpha Centauri is situated at the distance of 4.3 l. y. and its 11.5 mag. star Omega Centauri is a great globular cluster, containing thousands of stars of 12th to 15th mag. The killing of Hydra is also ascribed to Hercules. It seems that *Indra* and *Krishna* myths have been mixed up. But it is probable that Hercules has been also used as Cupid, darting his flowery golden arrow (Sagitta), and shot with it Ophiuchus (Siva) mischievously to enamour him of *Gauri* (Virgo). And Siva in his anger destroyed *Kamadeva*. Hercules, Sagitta and Ophiuchus, close neighbors, appear in the eastern sky in March, are in meridian in August and they disappear from the western sky in November. Sagitta (arrow) is situated between the two branches of the Milky Way (Kalindi) : *Kamadeva* is worshipped in April (Madana Caturdasi = Holi) when Hercules appears in the eastern horizon. The Greeks regarded Sagitta with 5 stars as the arrow of Cupid as well as of Hercules. Eridanus (*Saraswati-Akasa Ganga*) appears in the eastern horizon in November and disappears in the western horizon in June to descend to the earth, which is ascribed to *Bhagiratha*, and at that time, people take their baths in the Ganga as *Bhagirathi Dasahara*. From the left foot of Orion, Eridanus winds its devious way westward toward Cetus, thence in a wide curve southward and eastward, and then once again flows eastward until finally with a long southwesterly sweep it ends in the glittering 0.60 star Achernar (End of the River), situated at the distance of 70 l. y. with the glow of our 200 suns. Gamma

Eridani (Kursa) is a double star of 2nd mag. in the midst of stream. 32 Eridani is a binary of 4th mag. of yellow colour, and its fainter companion is of 6th mag. of blue or green colour. Eta Eridani is of 4.30 mag., situated at the distance of 20 l. y. has the velocity of 79 miles per second. 40 Eridani, a 4.48 triple, situated at the distance of 15 l. y. has the speed of 63 miles per second. When the sun enters into a constellation by the glare of its light it becomes invisible. The sun enters into Virgo on 22nd of September. But Virgo becomes visible at the end of March in the eastern horizon when *Vasanti Pujā* takes place. In June it appears in the meridian at midnight above Centaurus (Indra) as his consort Indrani, and Sagittarius in the eastern horizon. And when full moon appears in it, *Asāri Lakṣmi* is worshipped. And when Virgo appears in the western horizon and Sagittarius and Ophiuchus (Siva) in meridian, *Navarātri* and *Durga* and *Mahalakṣmi Pujā*s are celebrated. Sirius and Vega are Hydrogen; Mintaka and Alnilan are Helium; Delta Aquila and Alpha Carina are Calcium gaseous stars. Capella is of solar type.

9.—THE EPICS AND THE PURANAS

The epics and the Purāṇas deal with the tribal migrations and wars, genealogy of great rulers and seers, anecdotes, philosophy, laws, religious rites and ceremonies of ancient India. Of all these the *Mahābhārata* is the most important. Though nearly half of the *Mahābhārata* chiefly deals with the Kuru Pāṇḍava war, round this nucleus of the remaining half have been gathered the fragments of ancient poems, many anecdotes, customs and manners, philosophies and laws of the ancient land. The *Mahābhārata* is really a popular entertaining encyclopædia of ancient India prior to the Kurukṣetra War. The *Rāmāyaṇa* written by *adikavi* Vālmiki about third century B. C. and recast during the Brahminic Sunga period, deals

primarily with the adventures of Rāma. The Purāṇas deal chiefly with the genealogy of all ruling dynasties up to the Gupta period, religious rites and ceremonies of various tribes in different periods.

Many Vedic and Upanishadic verses have been freely incorporated in the huge mass of MBh including the supplement Harivamśa, containing about 100,000 verses. But in its introductory framework of Adiparva it is mentioned that the original MBh (1, 1, 81) consisted only of 8,800 verses and in the second revisory compilation it contained 24000 verses (1,1,101). MBh. 5,12,20 = Rv. X, 117,6; MBh. 12,285,70 = Rv. 1,10,1; MBh. 12,348,8 = Rv. X, 129,1-8; MBh. 13,102,18 = Rv. X, 14,1. MBh. 14,24,10 = Ait. Br. 1,1. Atharvaveda and Atharva Angirasa are mentioned in the MBh. (13,98,30; 8,69,83-86); Ontapatha Brāhmaṇa in MBh. 12,343,13-15 = Vā. 31,18 = Svetāsvatara Up = MBh. 5, 44,29. Katha Up. 2,15 = Gītā, 8,11; Katha Up. 8,9. Asvakhyan (= MBh. 5,46,6. MBh. 13,4,64) Grihya Sūtra, 1,15,9 = Kauśītaki Up 2,11 = Brihad Ar. up. 6,4,9 = MBh. 1,74,63-64. Vāyu Purāṇa is mentioned in MBh. 3,191,16; and the evils and misfortune described in Kali age in Vāyu P. 58,41 is exaggerated in MBh. 3,150. The Mahābhārata itself is called a Samhitā (collection), a Purāṇa (antiquarium), an ākhyāyana (anecdotes), a kāvya (an epic poem), containing many Śāstras (including Artha, Dharma, Kama-Śāstras, 1,2,388), full of vyākhyā (explanatory examples) and Upanishads (1,1,18; 49, 55). Drama as a varied poem (nāṭakā vividha) was also known (2,11,3). Draupadī was addressed: "Thou weepest like a *Sailasī*—an actress (4,16,43)". Marionette play is indicated by the expression, "God treats men as men do a doll on a string (3, 80 3)". In 1, 216,4, it is mentioned that the "Musicians sounded their instruments, the dancers (*nartakā*) danced, and the singers sang songs". Rāmāyana (2,59,4) even speaks of theatrical performance (nāṭakānyābuh). Harivamśa (2,150) mentions the dramatic representation of the *Great Rāmāyana* Post in which a *Vidvatsaka*, a stage jester of the classical drama, takes part. Harivamśa (2,150) mentions that Pradyumna, son of Yādava Krishna, in order to win Prabhāvatī, daughter of Vajranābha, comes with a whole troupe of actors to Vajranābha's court, and plays many dramas, depicting the

temptation of Risyasringa and Rambhāvisira nataka. MBh. (1,170,75 mentions Riks, Yajus, prosody, astronomy, etymology, grammar, phonetics; 2,260,30-35 Brahmanas; 18,104,87 rites declared in the Brahman's; 12, 802,11 of Satapatha Br., of Yajñyavalka; 12,844-377 of Aranyaka; 12,210,20 calls a Bhārgava, author of Nitisāstra, Nārada of music, Bharadvāja of archery, Gargya of biographies of seers, Krishnatreyā of medicine; 12,71,786 of Yaska's Nirkuta and Naighantuka; 12,819,33 of Vedānta and Samkhya; 12,349,56 of the Gita and the Vedānta; 12,321,80 of Nyaya; 1,70,12 and 12,380,64 of Samkhya, Yoga, Pancaratra and Pasupatya; 12,819,59 mentions that Hiranyastupa declared Yoga, and Kapila, Asuri and Pancesikha of the Samkhya; 12,306,33 discussed the 25 principles of Samkhya; 12, 806 of 26 principles; in 12,160,9 Kapila shows resentment against the Brahmanic rites in the cruelties inflicted in the cow sacrifice; 3,190,55 laments that edukas (Buddhistic shrines) are revered to the neglect of the temples; 12,339,40 discusses in Caturmharājika the Buddhist philosophy. MBh. (2,5) mentions Vedas, Upanishads, Nyaya, Samkhya, Patanjali, Siksha, Kalpa, Vyākaraṇa, Chāṇḍa and Jyotiṣa. Samkhāyana Gṛhya S. (4,10,13) does not mention MBh., but Sumanthu, Jaimini, Vaicampāyana, Pāila, Garga, Aśvalāyana GS (2,4,4) however mentions Sumanthu, Jaimini, Vaicampāyana, Pāila, Bhārata, Mahābhārata, dharmacaryas, Garga, Kāthaka (X,6) mentions Dhritarāstra, son of Vicitravīrya in connection with the sacrificial feast of the Kuru Pandavas. Pāṇini (8,3,96; 3,2,162; 6,2,88) shows the compound words Yudhiṣṭhira, Bhīma and Vidura. Patanjali makes the definite mention of the Kuru Pandava War, Jātakas (454) mention Krishna (Kamab). Dhātaraṭha is a king of the Nagas (Jāt. 543). Dhanañjaya is a Kuru king of Indraprastha of the family of Yudhiṣṭhira, and Vidura is his parukiṭ. Dhanañjaya is a famous Kuru king (Jāt. 515). Atharvaveda mentions Parikṣit (grandson of Arjuna), ruling in the Kuru land. Brihad Aranyaka Up. (3,3,1) indicates that Parikṣita's descendants have ceased to rule. In search of Sita Banaras are sent in northern direction amongst the Mlecchas, Palindas, Sarasenās, Prasthalas, Bharatas, Kurus, Madras, Kambojas, Yavanas, Sakas and Pahlavas (Ram. 4, 43,12). Kirāti (Ram. 1,66,3). In MBh.

8.45,35) Karna-Balya arguments it is said that the Yavanas are all-knowing and very brave (*Sarvajñā yavanāḥ śurasaivā*), and these Mlecchas (Molossia) speak a language of their own which is not understood by the common people of the Punjab. Bahikas (Greco-Bactrians) of Sakala (the seat of the government of Menander, son-in-law of Demetrius) eat beef, meat cakes and fried barley with garlic. Their women—tall blonds (*prīṭhi gaurī*)—dressed in fine wollen fabrics (*sukema kambala vāsini*), being intoxicated and halfnude, dance and laugh outside the city and indulge in indiscriminate sexual unions in their festivals. Their men sing when they go away abroad, "When shall I be back to Sakala, and being surrounded by well-dressed tall blond women (*gaurīḥ saha narīḥ prīṭhivīralankṛitā*) drink white liquor and eat beef, ham, chicken, camel meat and mutton with onion (8. 44). Among the Arattas (Orontes of Media of Phrygian, Briges or Bhrigu descent brought to India as mercenaries by the Greco-Bactrians) of the Punjab, not one's own son, but sister's son inherits the property (a custom prevalent also in Ansur: 8. 45, 18). Kāśakaras (Guptas were Kāśakaras), Karkotakakas (Kara Kirghis Nagas), Arattas and Khasas (Kassites of Dahrādum) are to be avoided (8. 34 46 and 58). The father-in-law of Menander Demetrius is mentioned as Dattamitra of Sauvira (Northern Sind: 1, 139, 21-23). Apollodotus, brother of Demetrius, and made sub-king by him of Barygaza (Broach) is called old Yavana ruler Bhogadatta, friend of Yadiśthira's father Pandu (2, 14, 14). (The Greco-Bactrians) of Gandhāra, Sindh and Sauvira (N. Sind), clad in armour, fight with javelins; they are fearless and very powerful. The Yavanas and Kambojas of Mathurā (Mathurā came in possession of Menander's army) are also expert in fighting (12, 101, 3-5). Kamboja ruler (Kuru-Cambyses 523-521) Kamattha who alone could frighten the Yavanas. Kirāta ruler Samacā, Yavana overlord Chanura and the Kaikeyas (Kaikawas of Kayan, Avestan Kavan dynasty. Skt. Kavi Usanas of Phrygian, Briges or Bhrigu descent) attended on Yadiśthira (2, 1, 22-26). Bronze or copper portrait sculpture (*śyāsi pratīma*: XI. 12, 23) like that of the Greeks is mentioned in the parlour of Dhṛitardra. "Krishna, though defeating Rukmi, you are enjoying the Bhoja

princess Rukemini; through anger you have killed Indradyumna and Caesar like Yavana (Kassaru-man = Oassar = a title, originally a surname of the Julian family of Rome which after being dignified in the person of dictator Julius Caesar was assumed by successive Roman emperors = Gk. Kaiser; 3, 12, 32)". Kamboja king gave many furs, broadened woolen shawls, and many horses. Sudras (Ohades) brought many cotton-clad, fair-complexioned, long-haired female slaves, decorated with gold ornaments. Bairamas, Paradus (Pahlavas), Abhiras (Avars) and Kitavas (Kitans) brought many jewels. The great charioteer Bhogadatta (Apollodotus) came with many Yavanas, Cinna, Sakas, Barbaras (Berbers), brought many first-running black-necked steeds, and brought of Balhika-China origin many woolen and (silk) worm-produced fabrics, which though not made of cotton, are soft and smooth like the lotus petals. Sakas, Tukharas (Tochari), Kanka and Romaka (Romans) brought much gold and horses as presents for Yudisthira (2, 51). Coming from the Baidada (Ila) region of Sameru (Merv), many Daradas (Darda), Pulindas (Pahlavas), Tunganas (Tunganases) brought much gold dust. Kiratas, Daradas, Vajyamakas, Odhumvaras, Paradas, Bahlikas, Trigartas, Yaudheyas, Kaikayas, Arnavasthas, Trakshas (Turks), Pahlavas, Kahadra Malavas, Kukkuras (a Vrisni tribe), Sakas, these well-born, highly disciplined armed warriors brought for Yudhisthira much wealth. Cholas and Pandyas brought many golden jars full of fragrant sandalwood essences. The Simhalas (Ceylonese) brought from overseas many pearls (mukta), the treasures of the ocean and beryls (vaidhurya; 2, 52). Andhras, Sakas, Pulindas and Yavanas are overlords (narādipati). Kambojas (Cambyses), Bahlikas and Abhiras (Avars) are brave (3, 188, 35-36). Then Kalki (Kaika Mongols who came with the Liuna invasion) will uproot them (3, 190, 93). Kāsi (zodiac: 3, 190, 90). Andhras are the overlords of the south, with the Guhas (Nava Nagas of Kalinga), Pulinda (Pahlavas), Savaras, Cucusas and Madras. In the north rule the Yaunas (though Ionoka was unknown in classical Greek it existed in the current Hellenistic Greek of the east as for example the Ionokopolis of Ptolemy), Kambojas and Gandbarians (Greco-Bactrians) with the Kiratas (Kitans) and Barbaras (Berbers; 12, 207, 42-43). Yavana = Gk. Iavon = Iouana of Darius = Heb. Javana = Hittite

Yavanna—Bab. Ionians—Yonakas of Nāsik cave inscriptions and Milandapāṇha. Sudras and Alhiras settled from the Indus to Sarasvatī (2, 32, 10). Terrible Pallavas, Barbaras (Berbers) Kiratas, Yavanas and Sakas (232, 16-17). Mleccha king on Śāgara-dvīpa (Broach of Demetrius; 2, 31, 86). Three thousand Sakas, Kāmbojas, Bahlikas, Yavanas, Paradas, Tunganas (Tunganees), Ambasthas, Piśāca (dynasty of Kashmir—Alpine). Barbaras (Berbers), Pārvatīyas (Guptas; 7, 1-9, 13-14) fought for Duryodhana. In Sakadvīpa (Trans-Oxania) there are settlements of Mriga Masaka (Massa Getæ), Mānasa and Magadha. Among them Magas (Magi) are the priests. In Masaka the rulers (Massa Getæ) are luxurious. In Manasa the Vaiśyas (Besti) are brave and powerful. In Magadha the Sudras (Chudes) are very religious. Among them there is no king, police or punishment. They mutually protect each other (8, 11, 25-28). Bardic songs in praise of men, that is heroes (gāthā nārasamā), are mentioned in Satapatha Br. (XI, 5, 6) and Asvalāyana Gr. S. (4, 3); and in As. Gr. 8 (3, 4, 4) Mbh. is also mentioned. So the upper limit of the Mahābhārata cannot be earlier than the 3rd century B.C. And as Buddhistic *śūtras* (3, 190.67) are revered at the cost of the temples, and Caturmahārajika (12, 389, 40) and Buddhistic philosophy, of the later stage of Buddhism are discussed, it was composed after Buddhism. In the body of the Mbh. there are numerous repetitions and elaborations of the same anecdotes and stories and many contradictions. So it is clear that Mbh. as it is is the accretion of various periods of countless bards. The court bards added many verses when they found the theme popular to get the public applause. That is the reason that it contains some of the finest descriptive or philosophical poems found in any literature. At the same time there are numerous verses of very little intrinsic value. But as it contains numerous references to Yavanas, Romakas, Kaserumat (Cæsar-like, 3, 12, 82), Parsas, Pahlavas (Parthians), Yaunas, Kāmbojas, Kiratas, (Kitan), Barbaras (Berbers; 12, 207, 48) and even Huns, so the lower limit of its compilation may be about 400 A. D. For inscription and literary references show that Mbh. by fifth century A.D. had already become a sacred literature. Bāṇa (600—630 A. D.) in his Kādambarī writes that queen Vilāsavatī was present at a recitation of Mbh. at a festival in the temple

of Ujjaini. In numerous land grants of fifth and sixth centuries, many verses from Anusāsana Parva are quoted as sacred texts and in one inscription MBh is called a *collection of a hundred thousand verses*, MBh 1, 1, 107; 12, 343, 11; the Calcutta edition has about 90,092 verses, of which 18,935 are in Santi and 7759 in Anusāsana. Kumārila Bhaṭṭa (650 A.D.) quotes numerous passages from all the 18 parvas of MBh. Kāthana in his Rājataranginī (3, 135) narrates that when Kaśmir ruler Avantivarman died in 833 he had the entire Bhāgavat Gītā read to him before he expired. Harivamśa, the supplement of MBh which contains about 10,486 verses, including which MBh consists of 101,154 verses, mentions Roman silver, gold coin *dīnāra* (denarius) which though found in S. India in 2nd century A. D., its literary use is not known before the Guptas used it in their inscriptions before 400 A.D. In Bhīṣma P (7, 11, 36-37) Magas (i.e. Magi = Gk. Magae) are implied; large vultures devour their dead and the skeletons are left in the caverns; they marry their nearest relatives. Santi (the first part of which deals with Politics and the second part with Philosophy) containing about 18935 verses) and Anusāsana Parva (a law manual, with extensive Manu repetitions, having nearly 7759 verses), mentioned to be the instructions imparted to Yudhisṭhira when after his consecration as king he went to Bhīṣma, lying in the battle field, mortally wounded, show to be later additions. The Bhāgavatagītā, the text book of the Bhāgavatas, popular in Sunga period when Diya (Dion), an ambassador from Mahārāja Antialikta (Antialcidas to Kaśiputra Bhogabhadra, the theopanthetheistic fifth Sunga ruler of Viśā, erected a Garuḍavyāghra pillar in honour of Vasudeva in 90 B. C., a philosophical poem based as a synthesis of the doctrines of salvation either through acquirement of knowledge (Jñāna), energyam (an active life performing duties by acquisition of wealth through industries Karma) or sincere devotion (absolute unselfish surrender to the will of the all-knowing and regulating Atman = Bhakti), based on Sāṃkhya and Yoga, has been bodily taken in the Bhīṣma Parva when on the battlefield Arjuna led by his charioteer Krishna, facing his enemies, instead of revengefully fighting to avenge wrongs, ponders over the evil effects of fighting and killing men for the sake of wealth and property while life itself

is transitory, and Krishna argues with his cousin and brother-in-law that soul underlying in every being can never kill or be killed by anyone or is affected by it, a doctrine of the Katha Upanishad. Many of the verses of the Katha and the Bhāgavat Gita are the same. Anugita seems to be a supplement of the Bh. Gita. Nārāyaṇīya, another text book of the Bhāgavatas is embodied in *Sānti* 834-851. Sanat-sujātya (Sanat Kumāra is another name of Pradyumnā) expounds the Vedānta philosophy. In *Sānti* 174, 7-9 the verses of the Jaina Uttārdhyāyana Sūtra (14, 21-28) are found, and in *Sānti* 174, 13, the Dhammapada verse of 47. Mahāyāna Buddhist principles in contrast to the Brahmanic conception of life are shown in the dialogue between Brahmanic father and his heretic son (*Sānti*, 175 and 277). The verses of slave girl Pingalā who not finding her lover, and contemplating on the futility of all desires, had obtained contentment of mind through *nivṛtti*, and "calmly sleeps now Pingalā, after she has put non-desire in place of yearnings (*Sānti*, 174, 178V), is based on 390 *Sīla Mimamsa* Jāt. The portion of the *Virāṭa Parvan* in which Arjuna alone unaided defeats the Kaurava army is a very late addition. In Tuladhara dialogue between a shop-keeper of Baranasi and Brahmin Jajali, the Mahāyāna *Maitrī* is taught (*Sānti* 261-264). *Samkhya Sūtra* (4, 11) also refers to Pingalā, "*Nirasaḥ sukhi Pingalāvat*".

Ramayana of Valmiki is older than the Mahābhārata, though some of its chapters might have been added later than the Mahābhārata compilation. For Ramopakhyana (3, 278-280), possibly an abridged form of Ramayana, is embodied in MBh. And MBh (7, 143, 66) quotes a *śloka* once sung by Valmiki which in fact is found in Ramayana (6, 81, 28). In various parts of MBh (1, 2, 18; 2, 7, 16; 5, 82, 27; 12, 207, 4) Valmiki is mentioned as an ancient Rishi. But the poetic style of Rām. is more refined. And the heroes and heroines of Valmiki do not show the passionate urge and vigour of the MBh personages. They are more restrained in their manners, perhaps under the Buddhist influence which was the dominant religion in Kōśala and Magadha for centuries. It may be said that the Pāli was the language of the Buddhists. But Pāli was the language possibly of Sakas, Mallas, Licchavis, Kōśals (Kassitas), and Bhojins of Magadha who are allied in race, recent conquering

bardic who practised democratic forms of government and had an eclectic religion. But the Aryans and the Brahmins did not give up their monarchic forms of government, Brahminic rites and cease to study the Vedas and Vedāṅgas, and give up writing their lore in Sanskrit. It is true the forms of poetry in MBh are more archaic, almost like the Sūtras in dialogic forms in which the speakers are introduced in prose as Karna, Arjuna or Krishna *uvāca*. It is because in the east poetry was more developed. MBh, (3, 84, 88; 3, 87, 11; 7, 68, 20) mentions the *akṣaya-vata* of Gaya, well-known, where offerings to the Pitrīs bring immortal results. It speaks of a time when with the decadence of Buddhism and revival of Hinduism Buddhist sacred tree is converted into a Hindu Tirtha. But Akṣaya-vat's branch was planted in Prayāg by Aśoka. MBh. 3, 86, 80 describes the place as Śringaverapuram where Rama crossed the river, but does not say anything of the tree. But Rām. (2, 56, 6) mentions it. However if the final collection of MBh was closed in Gupta period, Rām. may have been completed with its supplements of 1st and 7th books which are certainly not parts of Rām. which might have been composed by Valmiki in 2nd century B. C.

Markanda Purāṇa seems to be one of the oldest of the Purāṇas. In its introduction Jaimini approaches Markandeya, a MBh teacher (3, 205—216) on ethics and forbearance; for explaining things, and praised MBh as a compendium of the best of Dharma, Artha, Kāma and Mokṣa Sāstras (Mārķ. 1, 5-8). In MBh (12, 175 and 277) there is an interesting dialogue between a Brahmin and his Buddhistic son Medhavin. In Mark P (10-44) there is similar, but an amplified dialogue poem between father Mahamati and his son Sumati or Jara-idiot: in this there is a description of hell where Vipascit was taken by mistake, and he refused to leave hell before he could redress the sufferings of the tortured beings there by the action of his good deeds, a Mahāyāna conception. Kṛittika heads the Nakṣatras list up to Bharani in Mark P. (83, 8) as in Av. But Varāhamihir in his *Bṛihat Saṃhitā* of about 525 A. D. mentions the Nakṣatras from Aśvini to Revati. In MBh 13, 104 there are many verses as in Manu. Mark P has also many Manu verses but changed into better and compact language. Manu 3, 102, 82;

4, 146, 92, 56, 78—Mark P. 29, 33, 84, 17, 24. Aparark in his commentary on Yajñavalkya has quoted extensively from Mark P. chapters 11, 29, 30, 84, 35, 39, 40; Ballīasena from chaps. 48, 58 in his *Adbhutaśigara*; Hemādri from chap. 15, 23-35, 95-97 in his *Caturanga Cintāmani*. There is no genealogy in the book, but life of Dattatraya as minister of Haihaya Kartavīrya Arjuna is given. And how the dethroned Kāsi (Kassite) ruler Vatsa Ritadvaja, with the aid of Madālna and her Asvatara (Aasi = Yuechi) Naga relatives, regained Kāsi kingdom, and her son Alarka, trained by her, became a great Kāsi monarch. The lives of some Vaisālī kings of Vaisya (Bessi) tribe are mentioned. The book seems to be of the early part of fifth century and the *Devi Mahātmya* seems to be of sixth century A. D.

Vishnu Purāna is ascribed to Parāśara, belonging to Pancaratra Sect. In Vishnu P. (2, 9, 16) Nakshatras begin with Krittikā, and not with Asvini as in later Purānas. In Vishnu P. Hallika (Holika = Egypt. Phallika = Gk. Phagesia = Roman Saturnalia), has sensuous and erotic sentiments, but has no sexual intercourse as in Harivamsa. Rāsi—zodiacal signs are mentioned in Vishnu P. (2, 8, 28-30; 41-42; 62-68) and *kora* in Vishnu P. (4, 12, 13). In Vishnu P. (3, 17-18) it is mentioned that Vishnu stripped himself of all garments, shaved his head and preached on the Narmada the religion of the naked (Digambara Jainism) and made his listeners Ārhatas. Then he put on yellow garb and preached Ahimsa (Buddhism). Vishnu put on the *Māya Moha* forms in order to fool the non-believers. Sri, the radiant goddess of fortune and love, rose gloriously from milky ocean Kshīrābdi—the Milky Way. She is the Indrāni of Indra, and consort of Vishnu, the queen of heaven. Sri is the Roman Ceres, Virgo on the head of Centaurus (Indra), not far away from the Milky Way. Aphrodite also rose from the foam of the ocean. The genealogies of the ruling dynasties are given in prose, thus betraying its antiquity; of the Maurya period it is quite reliable; of the Vakataka and Bhava Nagas it gives detailed information. The Guptas and Hunas are indicated. In Vishnu P. the Yavanas are in the west and Andhras on the south which was the case in third century A. D. Vishnu P. consistently planned and written in a clear and terse language seems to be a work begun in third

and finished in early fifth century A. D. Vāyu Purāṇa is mentioned in MBh (3, 191, 16), and Hariavmsa (1, 7, 13, 25) quotes Vāyu as an authority. Bāṇa (625 A. D.) in his Harṣacaritra (Chap 3) mentions that he attended in his native village the reading of Vāyu P. Vāyu condemns the Nagnas (Digāmbara Jainas) and Nigrānthas as beastly (Pāśāṇḍa: 78, 24; 79, 25). Nakshatras are computed from Kṛttikā to Bharani (71, 50). In the genealogy of dynasties Guptas are mentioned and Huns are indicated. 37th chapter is devoted to the art of songs. It seems to be a work of early fifth century, though there might have been an earlier nucleus. Gayā Māhātmya (105-112, 22) is the latest addition, possibly in 14th century. Vāyu is the ancient Aryan god—Vedic Vāyu, Lat. Vento, Gk. Boreas. It mentions Paśupati Lakulīśa sect Ekalinga temple inscription near Udaypur mentions that he carried a rod (lakula) in his hands. The Lakulīśa images of Gujrat and Rajputana of 7th century show Lakulīśa Śiva with erect penis (Urdharetas). In vulgar parlance *setasa* (reed or cane), *vajra*, *lakula* or *lagura* (rod) were meant for erect penis as Lat. *virga*, Fr. *verge* mean both rod and penis, especially the latter. Rv. 1, 1, 1 = Vāyu P. 26, 37; Rv. 6, 16, 10, Śamaveda 1, 1 = Vāyu 26, 23; Ts. 1, 3, 14-22, 71; Tait Br. 2, 8, 8 = 14, 15; Tait. 1, 4, 10-81 = 19 Kath. Up = 104, 43; Keno Up 2 = 104, 37; Mundaka Up 3, 4 = 20, 5, Tait. Up = 8, 2 = 15, 15; Svet. Up 8, 16 = 80, 183. Asval. Sr S. 2, 6; Apa. Sr. 8, 1, 7, 3 = 75, 58. MBh. 13, 187, 26-82; 52, Bhag. Gita 6, 19-16, 37; 8, 17 = 100, 131. Vāyu P. Indradvīpa with the river Airavati = Burma with Irrawadi. Kasearudvīpa = Kazeih = Manipur. Tāmraparni = Ceylon; Nāgadvīpa = Indian Archipelago. Mahārava south of Bhāratavarsa = Indian Ocean. Malayadvīpa = Malaya Peninsula; Agni Dvīpa = Sumatra; Angadvīpa = Andamans; Kusa Dvīpa = Sunda Archipelago; Vārāhadvīpa = Hog Island on the west coast of Sumatra.

Matsya Purāṇa is the glorification of Matsya (Pisces), as a zodiacal representative of the stellar universe (Vishnu). Matsya is particularly associated with the flood legend, borrowed from the eleventh tablet of the Babylonian Gilgamesh epic. Matsya is the Bab. god Ea who prophesied the flood, and fish carried the boat built according to his advice, containing

men and seeds of all animals and plants, to a mountain height (Ararat) until the flood subsided. Both Matsya and Vāyu are possibly borrowed from Bhavīśya Purāṇa (a contradictory name—an antiquarium of the future age: but all Purāṇas describe the genealogies of the ruling dynasties from the Kurukṣetra war as future prophecies), for their genealogical tables are practically the same except a few late additions. And both of them declare Bhavīśya Purāṇa as their source of knowledge (Vāyu 99, 267—Matsya 50, 75; Vāyu 99, 270—Matsya 55, 77; Vāyu 99, 417=272, 37). Matsya mentions week days (Matsya 56, 4; 57, 4; 60, 5; 70, 88). The Gupta Era inscription of 484 A. D. for the first time has recorded week days, borrowed from the Greco Romans. Planet worship (Graha Yajna) is for the first time introduced (98, 94). A supreme god consisting of the important stars and planets (Nakṣatra Puruṣa) is for the first time conceived. Buddha also becomes an incarnation of Vishnu as Rāma and Krishna have become incarnations in the supplements of the Rāmāyaṇa and Mahābhārata and Harivamśa. Buddha is not an incarnation in Jayākha (about 450 A. D.) and in Abhibudhnyā Samhitā. The Pallava inscription of Buddha in the latter half of 7th century indicates a newly introduced creed. Both the Vāyu (45, 112-114) and Matsya (144, 87-89) give prominence of the Godāvari reigon. The Narmadā is the important river (Matsya 2, 13). And the Matsya version of the Andhra dynasty seems to be reliable. On the whole Purāṇic historical knowledge is very vague, quite unlike the Chinese books which are quite accurate. Matsya (271) makes Ripunjaya the last of Śabadeva Jarāsaṇḍha dynasty of Magadha. Ripunjaya is said to be slain by Palaka who places his son Prodyota on the throne. Nandivardhan, the last of the Prodyotas, is said to be slain by Sisunāga, and Bimbisara is the fifth of the Sisunāgs. Thus Bimbisara is separated from Prodyota by about 8 generations, and a period of 304 years. From Buddhistic books and Bhāṣa's Svapna Vāsavadattā we know that Prodyota of Ujjaini, Bimbisara of Magadha, Prasenjit of Kosalā and Udayana of Vatsa were contemporaries of Gautama the Buddha. In the Kosalā dynasty at the bottom of the list is Marudeva, Sunakṣatra, Kinnarasva, Antarakṣha, Susena, Sumitra, Brihadvaja, Dharmān, Kritanjay, Rana,

Rasanjay, Sanjaya, Suddhodana, Siddhārtha, Puskala (Rahula) and Prasenjit. Now everybody knows that neither Sakya Suddhodana, nor his son Siddhārtha Gautama Buddha or Rshula were kings of Kosali. Suddhodana was but a feudatory chief in Sākya republic within Kosala empire. Buddha and his son renounced the world early. Prasenjit's son Virudaka by a Sakya Mahaman's slave girl, usurping his father's throne in conspiracy with his father's commander-in-chief Cārayana, not only killed many Sākyas for an insult given to him as a son of a slave girl when visiting his grandfather's house, also Sākya and Kūṭita territories were embodied in the Kosalan empire. Matsya mentions Hunas. Therefore the work seems to be of early sixth century. Susā as a centre of astronomical observations, possibly under the Sasunids is indicated. Matsya seems to be the ritual manual of the Mīna - Mānava tribe.

Bhagavat Purāṇa is a manual of the Vaiṣṇavas. It inculcates fervent Bhakti cult. It makes Kapila and Buddha the incarnations of Viṣṇu (Bhag. 1, 3; 2, 7; 6, 8). It has quoted a few verses in common with MBh (4, 41-49). Sakuntalā episode is given in 4, 40. Krishna's life is given in more details than in Harivamśa and Viṣṇu P. And though there are love dalliances with Gopis in Kārttiki Purnima festival, attended with dances and songs (Bhag. 10, 19; , Hari. 76: Mallikā - Egypt. phallica = Gk. phagesia = Roman Saturnalia), there is no mention of Rādhā which indicates that it is earlier than Gīta Govinda. Bāṇabhaṭṭa in his Damaśāgara mentioned Bhag. P. But, as it mentions Turaskas (Turks) as rulers of India, the work seems to be of ninth century, though it is likely that it has been built upon earlier materials. Rādhā is first mentioned in Brahma Vaivarta P. (Brahma) where Rādhā is the inseparable part of Krishna and his eternal loving consort by Nimbarka of Telanga country who settled in Brindāvana. According to him Krishna is Brahman and Rādhā sprang up from him as his soul. Nimbarka wrote Vedānta Parijāta Saurava.

Kurma Purāṇa begins with the glorification of Kurma (Turtle = Cancer) as the incarnation of Viṣṇu. It was Pañcātrata book, which is betrayed by its earlier chapter, possibly of 8th century. But later it became recast about 1000 A. D. by Paṇḍitā (1, 14, 22). Śrī thus became the Śakti of Viṣṇu,

their main source. Brahma and Siva get their Sakti (I, 1, 37; I, 1, 44). And Vishnu is himself transformed into Mahesvara (I, 1, 67). And Tāntrika schools as Kapāla or Kapilika, Bhairava, Yamala, Vāma, and Athata and Kapila doctrines (I, 12, 256-258; I, 16; 2, 16). Vāmana Purāṇa, narrated by Pulastya (Gk. Pelasgos—Egypt. Palesati—Assyr. Palastu—Bib. Philistine) to Narada, the glorification (14, 49) of Vāmana (Perseus) as the incarnation of Vishnu. In Vāmana weekdays; Tukharas, Toohari; 13, 14) and Turaskas (Turks 14, 49) are in the north (13, 12). This indicates the work cannot be earlier than 900 A. D. In MBh (12, 384) Vishnu is said to manifest himself as Hamsa (Cygnus), Kurma (Cancer), Matsya (Pisces), Varāha (Lupus), Narasimha (Leo; bicephalic man and lion of the Khattis, found in Carohemish), Vāmana (Cepheus), Rāma (son of Jamadagni), Rāma Dasarathi, Satvata (Krishna), and Kalki (Kalka Mongol as the future avenger of wrongs). Garuḍa Purāṇa is the glorification of Garuḍa (Eagle—Aquila) as the incarnation of Vishnu. Garuḍa P.—Tarksha P (Vāya 104, 8; 12, 13, 8). Balaśena in his Dānasāgara mentions Tarksha P. which according to the contents reveals its identity with Garuḍa P. It deals with astronomy, examination of gems, and summarizes Manu and Yajñavalkya smṛiti's, Vṛhat Samhita, Kātap Vyākaraṇa and Astānga Hṛdaya Samhita. Kātantra grammar was written by Sarva-varman for the Andhra king in first century A. D. Vervel derivatives were added to it by Kātyāyana a century later. Garuḍa makes an abstract of both in two chapters. Alankāra (rhetorics) sūtra did not develop before 8th century. And Garuḍa does not mention it. Garuḍa was the patron deity of the Guptas and was on their ensigns. Garuḍa P. developed under the auspices of the imperial Guptas and recast in 10th century. Varāha P is glorification of Varāha (Lupus) as an incarnation of Vishnu, and there are discussions between Varāha and the Prithivi (Earth). It is an unimportant Pañcarātra work of about 10th century. The Boar says to the Earth, O beautiful lady, I have narrated to you the all comprehensive Varāha-samhita (112, 63). In Satapatha Br (1, 8, 1; 7, 4, 3; 1, 2, 5) Matsya, Kurma, Varāha and Vāmana are regarded as avatars of Vishnu. In Matsya P (5, 8, 4), originally there was one Purāṇa (ancient history) from which other 18 Purāṇas have originated.

Dasaaratha the Ikshvaku (Achsan Aryan) king of Ayodhya had no sons. To obtain them he made a Putresti sacrifice by Risyasringa, a priest of his friend and ally Lomapada, king of his neighboring kingdom Anga. It is said that Risyasringa lived in a forested cave in the midst of wild animals with his father from his childhood, and he saw no human female. There was a drought and famine in Anga. And it was prophesied that Risyasringa alone by a sacrifice could remedy it. Lomapada's daughter Sântâ (some Puranas mention a courtesan) went to the wild forest in a boat to bring Risyasringa. Risyasringa was charmed at the lovely sight of Sântâ's beautiful body. He welcomed her as his guest. She offered him some sweetmeats, calling them fruits. Risyasringa never tasted such sweet and soft tasty fruits. She danced rhythmic voluptuous dances, revealing the charms of her body in undulatory waves. Her melodious songs in soft cadences were thrilling. Risyasringa was enraptured. He never heard, saw or dreamt of anything so beautiful. It was a revelation to him of new joys. He asked why there were two globular fruit like growths on her breasts. She answered they were tumors that were oppressing her. If he would press them gently with his fingers or lips it would give her a pleasant relief. He asked why there was a molluscan mouth (sukti-mukha - snail) in her pubic region. She showed the vulvar chert which she said was due by a severe bite and tear made by a ferocious boar, and the wound was giving her great pruritus and if he would introduce his pubic rod into it and rub it by its thrusts, it will be a friendly aid and comfort to her. Risyasringa did as he was directed as a duty to hospitality, and he found it quite entertaining and delightful. And thus he was seduced and brought to Lomapada's court. Risyasringa legend seems to have been borrowed from the third tablet of Gilgamesh epic of Hammurabi period (2030 B. C.) Gilgamesh had a dream which no one could interpret. But a great seer Enkidu who lived in a lonely mountain cave perhaps could. So Gilgamesh sent a courtesan to seduce him. Her beauty and voluptuous charms maddened his senses and he came to Erack with the temptress. Whatever might be the origin of Risyasringa legend, it was a popular spicy tale and early

performance with thousand entertaining embellishments. Its dramatic play is found in Ram. (1, 9), MBh (8, 110—113), Jatakas (528, 528), Puranas, particularly in Padma Purana.

Dasaratha had four sons through three wives: Rama Candra through Kosalya, the princess of Kosala (Kassites Khasa-Kasi) who occupied northern parts of Ayodhya by conquest (Ram. 1. 18); Bharat and Satrugna through Kekayi—the princess of Kekayas (Kaikush or Kayan prehistoric dynasty of Media and N. Iran, allied to Kavi Usamas (Sukra) tribe, that is Bhrigu = Briges = Phryges = Phrygians, who occupied the Punjab and north-western parts of Ayodhya), and Lakshmana, through Sumitra, an allied tribe woman. In ancient India the marriages were generally based on political alliances, and Dasaratha's marriages were no exception. In alliance with Divodasa = bright Dasa = Dacian of Panctla, Dasaratha waged war against the Timidvaja Sambaras (mixed Monkhmer Cimbris = Suevi = Sambu = Sabaras; still displaying prominent Mongolian traits which they received in their passage through Trans-Oxania), and in an encounter in Dandaka forest, Dasaratha was twice severely wounded, and only by dexterous chariotearing of Kekayi and her careful nursing, Dasaratha's life was saved, and Dasaratha promised Kekayi two presents of her choice (2, 9, 11-18). Divodasa's sister was Ahalya. She was married to Gautama. For her love intrigues and adultery with one Indra, she was deserted by her husband. But Rama Candra, the eldest son of Dasaratha, in one of the expeditions against the Sambaras, became the guest of Ahalya. A Savari welcomed Rama with presents of flowers and fruits. As Ahalya became the hostess of the crown prince of Ayodhya, Gautama thought it prudent to patch up his differences with Ahalya and they became reconciled. Gautama and Ahalya's son was the famous archer Saradvant who became the chief minister of Siradvaja, king (Janaka) of Mithila (= Mitanni: Ram. 1, 50, 6). Siradvaja had a pretty adolescent daughter Sita (Lat. sulcus = furrow = vulva). Saradvant brought out the matrimonial union of Rama Candra and Sita, thus fostering a political and military alliance between the Ikshvakus and Mitannis. Dasaratha wanted to declare Rama as the crown prince and successor, who could count upon the support of Kosalas and Maithilis. But Kekayi,

instigated by her powerful kinsmen, objected to it. And Rama Candra and Lakmana were sent (or banished from the court) with Sita to fight against the Pulasta (Assyrian Pulasti; Bib. Philistine = Gk. Pelasgi) Raksasas (lords) of Lanka (a high place, possibly Amarakantaka) whose king Dasagribha Ravana and his powerful army were harassing the settlements (Janapadas) in the Dandaka forest. In Savara language Lanka = high place; Jatan = Janasthana = a place below mountain; Dandaka = a marshy ground. Ravana's sister Surpanakṣī (sharp-nosed = eagle nosed, better reading than Surpanakhā) was disfigured by having her nose and ears cut through by a sharp sword by Lakmana, as it is said as she was praising her beauty over that of Sita and made love advances to Lakmana. Ravana abducted Sita. It is said that Rama, Lakmana and Sita crossing the Ganga (Me-mother Kong. Chin. Kiang = river) where Rama's ally Guhaka's (Nava Nāgas known as Guhas ruled Kalinga's in Gupta period) territory was situated, reached the Bharadvaja settlement at Prayāg where Sita saluted the Nyagradha tree (planted by Asoka), and when crossing the Yamunā, Sita promised the river goddess that on her successful return to Ayodhyā she will offer her a hundred cows and a hundred jars of wine. At Chitrakuta they stayed nearly 18 years. As they stepped into the neighboring Dandaka forest Sita was abducted. Rama took the help of the Kishkindha Bānaras. Kishkindha is a Bānara settlement (Janapada) in the Mekala Range of the Vindhya (Matsya P. 113. 51-54; Vāyu P. 45. 132-134). Just adjacent to the Mekala Range is the Bhenar (Bānara) Range. Sugriva who was deprived of his kingdom and of Kishkinda and his pretty wife Rukshmi by his brother Bull, got back both his kingdom and his wife with Rama's help, befriended Rama to get back his wife, Sita. Sugriva gave instruction to Bānaras to search out Sita in the south—thousand hills of the Vindhya, the Narmada, Godāvari, Krishna, Veni, Utkala (8, 41). So Kishkindha Bānaras lived north of the Vindhya ranges, and from which Narmada and Godāvari originated. This is the region of the Oraons, a clan of which not long ago was known as Bandarwas who were completely nude and lived on trees and in caves, subsisting on wild fruits and tubers and by hunting. Pulasta

Ravana lived in Lanka, which in Telunga and Oriya languages, is still used as an elevated region. Perhaps Ravana's Lanka was situated on the Amarakantaka plateau. Ravana was the name of the king of the Pulastas, ■ Janaka among the Maithilis, Asvapatis among the Madras, Cæsar among the Romans. Korkus in this and neighboring regions still sing in the Mundari language: "Ravana has come from Lanka and is standing in the village wrestling ground. Mothers and sisters, come and see. The girls sing: We have no proper ornaments and clothes, how are we to appear (before the king)." It is said that Lanka was situated across a Samudra (ocean) and was dvipa (island). But Sakastan (Seistan) which was situated between two rivers, was called a dvipa in an ocean. In MBh (2, 25) oven Sialkot is called *Sakala dvipa*. A tank built by Chandellas at Mahoba was called *Kirata Sgara*. Sangor in C. P. has been named after a tank called *sgara*. Perhaps there was a marshy expanse of water at the bottom of the Amarakantaka in ancient times, and for this reason, it was called Samudra. A Gond king about 400 years ago inscribed his name on gold coins as Sri Sangrama Shaha of Paulasta vamsa. It is very likely that Pulastas ruled over the Gonds, and their blood has been diluted among the Gonds beyond recognition, though their kings may still trace their descent from the Pulastas. Hook swinging in this region, practised for securing good crop, is still called *Meghanâdha* who is mentioned in Rām. ■ the eldest son of Ravana. A high pole is erected and a cross bar turning in a socket is secured to the top of it. The Bhumka (bhumika = landlord) is tied to the crossbar by ropes, the ends of which are held by the people below who swing it five times to get plentiful harvest. Of course it is said that Rām's abode was in Pancavati (where there were 5 banian trees) on the Godavari. There is still Gupta Godavari, 9 miles s. w of Chitrukut, which rushes from a cave in a hill and loses itself in a well, as Sarasvati has lost itself in the desert. From the description of Rām. it is clear that Satikshana's asrama was only a few yojanas from Chitrukuta, and Agastya's (a Pulasta priest) asrama was not far away, and Pancavati ■ the Godavari was only two yojanas from Agastya's asrama. In Raumudi Mahotsava, Kalyanavarman was hiding in the Vindhya in Vyāda Kishkinda near lake Pampa, close to

Vindhavasini temple, which is also called Pampāpura, 3 miles west of Mirzapur. Ravana made Madhu Danava (Gk. Danaoi; Bib. Dinah) marry his sister, and he married Maya Danava's daughter Mandodhari (slender-waisted—a trait of Mycenaeans 6, 7). Bibhisana married Sarama, daughter of Gandharva Sailusa (3, 22, 2) and Kimpurnsi (Cimmeri=Canaanite; in Telal-Amarna tablets, Kinakk=Gk. Kimmeroi of Crimea; Assurbanipal (648626) called them Gamir=Heb. Gomer (*Gen.* X, 2) (3, 27, 5). Mandodhari's mother was Hemā. Ravana had moon-white complexion, fine brows and prominent nose (Rama. 6, 13, 24). Mandodhari boasts that she is far more beautiful than Sita (Ram. 6, 18, 22). When after victorious conquest of Pulastya, Rama returned to Ayodhya, Bharata who had occupied the Ayodhyā throne, became the viceroy of Sindhu of his maternal uncles, the Kekayas (Iranian Kaikawas). Bharata had two sons Pushkara and Taksha. Pushkara founded Pushkaravati (Peshwar) and Taksha Takshashila (Taxila) in Gandharvadesa (Gandharva, a Cimmerian tribe 7, 101, 11). Possibly Taxila was occupied by Takshaka (Tochari=Tajiki) Nāgas, after whom the city was built. Son is often used in the Purāṇas for a successor. Rama banished his wife, who during the exile gave birth to Lava and Kusa. *Kusilava* means wandering bards. However after Rama's death Ayodhya kingdom was split up into two parts. The northern part was ruled by Lava, perhaps as a successor of his maternal uncles the Kosalas (Kassites) with Srāvastī as his capital. The southern part was occupied by Kusa (Kassite) with Kusaasthali in the Vindhya as his capital (Vayu P. Ch. 88). Pāṇḍava Bhīma in Asvamedha Yajña brought submission of Brihadvala of Kosala and Dhirayajña of Ayodhya (2, 29). It seems the Kekaya influence was diminished and the Kosalas became dominant. Kusa's son was Atithi, Atithi's son was Nishada. Nishada Virasena's son was Nala. Nala was befriended by Rituparna, grandson of Lava, belonging to the same Kosala tribe. Nala married the Vidarbha princess Damayanti. Nala was deprived of his kingdom by his brother. Nala with the help of Karkatas (Kara Kirghiz) came to Rituparna. Damayanti with her son and daughter Indrasena came to her father. As Nala did not return, Damayanti announced in Rituparna's court that she was making arrange-

ments for a Syayambara for her remarriage. Nala hastened and was re-united with Damayanti. Nala recovered his kingdom. Nala upakhyaṇa (MBh. 3, 52—72) is a beautiful piece of poem with fine description of wild forest scenes of Vindhya Hills and very tender sentiments. Nala and Damayanti's daughter Indrasena was married to Mandgala Sudās (Dacian). Indrasenā Mandgalini was a daring charioteer (Rv. X, .02). In Egyptian mythology the moon god Thout was a baboon salutes the rising and setting sun (Vishnu-Rāma). Cynocephalus (Puranic Hanuman) is the scribe of god of wisdom. Thout as Ibis represents possibly the crescent moon. Jāmbovan is a Telugu-speaking priestly clan of Madiga-Mochi-Mahar-Mang-Mahang-Mātanga, a Monkbmer Gond (Candāla) people. Hanuman was their chief deity.

Kadru (Susinak Kudura) is described in MBh (1, 66, 70) as the Mother of Nāgas, particularly of Sesa. Sesa, Ananta, Vāsuki are separate sons of Kadru (1, 65, 41). Other Nāgas are Takshaka, Karkotaka, Aryaka (Arasces), Dhananjaya, Kuru, Kauravya, Asvatara (Assi-Yuechi) and Dhritarastra (8, 84, 32; 5, 108, 15). Vrishnis are associated with Sesas (1, 67, 152; 16, 4, 18). Sisunāg dynasty of Magadha and Susika, originator of the Andhra dynasty, have originated from the Sesanāgas. It is said that Sesanāgas were saved from the attacks of Janamejaya by the advice of Astika, son of Airavata Jaratkaru, a Rigvedic seer (X, 76). It is said that Takshakas killed Parikshit, grand son of Arjuna, and Parikshit's son Janamejaya fought against the Nāgas and conquered Takshashila from them. With the help of the Karkotakas in the Vindhya Hills, Nala found his way to his friend Rituparna of Kosala. Takshakas and Asva-senas (Asvakas-Yuechis) occupied the Khāndava region (MBh 1. 1, 130-234). By marrying Madālasi, an Asvatara princess and with the aid of her kinsmen, Vatsa Ritadvaja and their son Alarka of Kasi dynasty could drive away the Haihaya Vitihavya Tālajanga conquerors who had occupied the Kasi territory for about a century and a half. Karkotakas (Kara Kirghiz) were established in Kashmir, Vindhya and at Mahismati on the Narmada (Mandhata). Karkota women of Mahismati had the privilege of enjoying sexual intercourse with anybody they pleased without any restriction (2, 30). Aryaka's (Arasces) son

was Cikura—(Gk. *kirkos* = Lat. *clonus* = curl.) of Airavata clan, of daughter's son of Vamana (5, 103, 28). Aryaka was the grand father of Kunti's father, so Bhima was his *Dauhitro Duhitra* (1, 128, 60). Ulipi, named possibly after *ulupin* (= dolphin), daughter-in-law of Airavata (*Nāgarājanusā*), sister of Vāsuki and a daughter of Kauravya, the mother of Iravat, was captured by Arjuna (4, 2, 14; 14, 19, 22; 1, 214, 18) in the Gangetic region. Citrāngadā, the Kauravya kulendindī (14, 81, 1) of Manipur in Kalinga, was married to Arjuna, and their son was called Babruvahana. Vasuki (*Wasun* = *Uanibis* = *Wasuggi*) was the ruler Bhogavati (1, 207, 31; 5, 188, 27) at Prayāga (3, 86, 88). Bhogaa and Takshakas help Arjuna (3, 97, 48).

The son of Vinatā is Tarkshya, possibly some mixed eagle nosed Turks, associated with Pabhasas (3, 52, 15). Rākshasas are sons of Pulasta (1, 68, 7; Rām. 8, 32, 23) and brothers of Yakshas (Yuechi: 1, 67, 89). Vaisali (Bessi) Trinavinda's daughter Dravirā (after whom S. India has been named Dravira) was given in marriage to a Pulasta chief. Their son was Visravas. Visravas married Devavarnini, daughter of Bharadvāja. Their son was Kubera. Kubera's grandsons were Yakshas, Rākshasas, Gandharvas (5, 111, 11) and Guhakas (2, 20, 3), and his attendants were Vidyādharas, Kimpurasas (Kinnaras) and Gandharvas in Kailasa region (6, 6, 41). He rules over Rākshasas (S. B. 13, 4, 8), Yakshas and Guhakas (Av. 8, 10, 2^a). Yakshas and Yakshis are very handsome (3, 58, 18), like Gandharvas and Kimpurasas. All Gandharvas are beautiful, particularly their women who are known as *kantās* of *kāminas*—the beloved of lovers (3, 158, 96). The females are well-dressed, graceful, and fond of music and dances (Rām. 6, 114, 4). Vidyādharas, Gandharvas, Kinnaras, Siddhas and Nāgas are devoted to pleasures of life (Rām. 4, 48, 53). Vidyādharis are very pretty (4, 4, 18). Ravana captured fair women of Vidyādharas, Kinnaras and Gandharvas (Rām. 5, 12, 20; Rām. 6, 61, 10). Kimpurasas men and women, very pretty, fond of fine garment, graceful movements, dances and music (Rām. 8, 46, 22) are noted for their conjugal fidelity. They belonged to Cimmerian and Yuechi-trans Himalayan tribes (Jat. 485 Candra Kinnar), mixed with the Alpine Turkish elements. In Rīgveda Gandharva is the multicoloured rainbow, and *Āpsarī* is the water-drop that holds the rainbow when the sun

light is scattered by falling on them. Later it became water nymphs. In MBh Apaaras are the temple courtesans. They dance, sing and display their charms before the gods and the spectators. Their charms are so seductive, that not only chiefs and nobles, but even Yogis are captivated by them. They are the Devadāsīs of the later period. These temple courtesans are called god's girls (1, 130, 6). They have no husbands and they are free to all (Rām. 7, 26, 41). The most famous of these epic temple courtesans are : Urvasi, Ritusthali, Kāmayā, Kumbhāyonī, Kesinī, Guṇavara, Ghritāñjī, Cārunetrā, Cārumadhya, Citra, Citralēkhā, Citrasenā, Janapadi, Tilottamā, Pāncakūrā, Pundarika, Purvacitti, Prabhā, Manorama, Manoharā, Mālavī, Menakā, Varanans, Rati, Rambhā, Ruci, Suratā, Surasā, Surupā, Sulocanā, Hāsini. As many of these girls were dedicated to the temples of Indra they were called *Indra Kanyās*—Indra's maidens (13, 101, 21). *Kanyā* in Vedās (Rv. 1, 129, 10—161, 5) and in Zendvesta (Yasna 53, 4 : Kainyo) means bride or pretty maiden. They also dance at weddings of nobles (Rām. 1, 78, 35), beautified by fine elocution (Rām. 5, 4, 10). They are the objects of sensual pleasures of all in the temples of phallic deities—Bhaga Devanuyāts (14, 43, 16).

Kavi Usanas Sukra was a Bhrigu (Briges—Phryges—Phrygian). Sukra is also planet Venus whose rays are favourable (1, 65, 86). Kavi Usanas is also found in Yasna 82, 4. Kavi is the Kaikush or Kayan dynasty of Media of Phrygian origin. In Rv. 1, 83, 5 we find that Atharvans (fire priests) were the first to show the path of sacrifice, and Usanas Kāvya to drive away the cattle. Kavi Usanas was the minister of Asura (Assyrian = Heb. Asahur—Ir. Athura) Vrishparvan. Kavi Usana's wife is Sataparvan (5, 117, 13) and his daughter pretty Devayāni. Usanas, best of Bhrigus (1, 80, 1) and being reputed as an author of Nitiśāstra, is called Nitiśāstra katri (5, 39, 30). Atharvan Angirasa Bhrihaspati, the priest of Vaisali king Marutta, sent his son Kaca to learn from Usanas the art of reviving the unconscious. Brihaspati also is planet Jupiter (Rām. 2, 99, 41). Draupadi quotes also a Niti of Brihaspati (3, 21, 1). Kaca and Devayāni, both adolescents, roaming together in dales and vales, gathering flowers, dancing and singing together, became very fond of each other. Particularly Devayāni fell in love with Kaca. After finishing

his studies when Kaca wanted to depart, Devayāni asked Kaca to marry her and take her with him ; Kaca refused to marry her and departed unchivalrously. Asura ruler Vrishaparvan had a daughter Sarmisthā of the same age as Devayāni. Both of them were good friends. But somehow they quarrelled. And Devayāni became furious. He asked his father Usanas who was very fond of her to leave the place, as Sarmisthā had taunted Devayāni as the daughter of his father's seville court bard. As Usanas dearly loved his daughter and did not want to displease her, he refused to continue as the minister of Vrishaparvan. But As Vrishaparvan highly valued his service, Kavi Usanas agreed to remain his priest if princess Sarmisthā agreed to serve Devayāni as her companion and maid in order to reconcile her. Sarmisthā had no objection. Devayāni married Yayāti, and Sarmisthā accompanied her friend. With Devayāni Yayāti had Yadu (Yutean) and Turvasu (Av. Turvite, Tur = Mediterranean); with Sarmisthā Yayāti had Druhyu = Druse, Anu (Yast 122 : *Aīnya*), Puru (Purushbatti = Parsa : MBh. I, 84). One Bhārgava branch was known as Kekayas in the Punjab. The other Bhārgavas settled in western India. It is said that the Bhārgavas being oppressed by Yādāva Haihayas came to Kānya-Kubja of Kusika and Mitanni Gādhis (Gudhea = Guti = Kurds). Bhārgava Urva's son Rishika, skilled in archery, made an alliance with Kusikas by marrying Satyavati, daughter of Gadi ; their sons were Jamadagni and Ajigarta ; Ajigarta's son was Sunasepa (whose penis was hard like that of dog). Jamadagni married an Ikshvaku lady Renukā ; their son was Parasu (a double axe of the Mycenaeans) Rāma. Haihayas overrunning Purus (Purus Khatti = Kshatriya = Lat. Chatti = Gatti = Hind. Chattri = Gk. Kattoo, a Germanic tribe mentioned by Tacitus ; which became later known as Hetti, Hesse ; after the people the territory is known as Hessen ; Hittite) and Kāsi (Kassite), kingdoms attacked Kusika (Kassite) Gādhis (Guti = Kurds = Gudean : Amorite Amara or Marya Harri Mitanni people) and Haihaya king Kartavirya Arjuna killed Jamadagni ; Jamadagni's son Parasurāma killed Kartavirya Arjuna. Like the Puru and Kāsi kingdoms, Kusika Gādhis lost their domination. Parasu Rāma fled to Konkan at the advice of his priest Kāsyapa (Kasipi = Caspian, a priestly clan of the Kassites). Viśvāmitra losing his kingdom

to the Haihyas aided Satyavrata Trisanku, the crown prince of Ayodhya who was exiled by his father Trayyārūna for his conciliatory policy towards the Haihayas whose princess he had married. With the help of Visvāmītra Trisanku secured the Ayodhya throne, overcoming the opposition of their hereditary ministerial family Vasiṣṭhas) — Achæan *Ægisthus* who slew his uncle Atreus (Pur. Atris) and placed his father Thyestes on the throne of which he had been deprived by Atreus. *Ægisthus* took no part in the Trojan war. Agamemnon with his brother Menelaus were brought up together in the house of Atreus. Agamemnon usurped the throne of Thyestes. Agamemnon became the commander-in-chief of the Achæan forces to avenge the abduction of Helene by *Phrygian* Paris. During his absence *Ægisthus* seduced Agamemnon's wife Clytemnestra. *Ægisthus* murdered Agamemnon on his return, and reigned for 7 years in Mycenæ. In the 8th year *Orestes*, son of Agamemnon, avenged the death of his father by murdering the adulterer. *Usipites* of Tacitus, and *Quiriti* of Strabo, a Germanic tribe who were driven by Suevi in 69 B.C. from the left bank of the Rhine) under the leadership of Devarāj Vasiṣṭha. And Visvāmītra became the chief minister of Trisanku, but his son and successor Hariscandra dispensed with the service of Visvāmītra, and took the aid of Vasiṣṭhas. By a revolution fostered by Visvāmītra and his party, Hariscandra lost his throne, and he and his queen Saivya and their infant son Rohita were compelled to live in exile. However by reconciling Visvāmītra he regained his kingdom. It is said that Hariscandra had no son. And he prayed to Varuna that if he were blessed with a son, he would sacrifice the child to Varuna. But when he got Rohita, he hesitated to sacrifice him. And when Rohita grew up he purchased Sunasepa from his father Ajigarta, brother of Jamadagni, to be sacrificed in his place. Visvāmītra rescued his nephew Sunasepa and adopted him as his son as Devarāja. Madhucchanda accepted the leadership of Sunasepa Devarāja, and their descendants had the ancestral name Kausikas (Kassite). Kausikas settled in N. Behar, and after their settlement, a river was called Kausiki (Kos). Other sons, possibly later, led the Andhras (Sesa Nagas) Pundras (Pulindas = Bhils) and Sabaras (Cimbri = Sambara = Suevi) in the Vindhya Hills.

Haihaya Tāla Jangha Vitihora (Vitahavya) being defeated by Pratardhana of Kāsi dynasty became a Bhārgava priest. Vitihotra's son is Gritsamada. Gritsamada and Garteamas are the composers of the Rigvedic second Mandala. 16th descendant of Gritsamada is Sunaka whose descendants are Saunakas. After Haihaya Tāla Jangha Vitihotras were driven away by the combined armies of Ikshvāku Sagara and Kāsi Alarka. Khatti Purus rose under the leadership of Dasyanta. Dasyanta married Sakuntala, daughter of Viśvāmitra descendant by a temple maid (apsarā = Devadāsī) Menaka. Sakuntala was deserted by both of her parents and she was brought up in Kanva Kasyapa's academy. Kasyapas belonged to a priestly clan of the Kasis = Kassites. There Dasyanta married her. But Dasyanta forgot everything of this love episode. Even when Sakuntala presented herself before Dasyanta in his court, he at first said he did not remember it. Later he accepted her as his wife, and her son Bharata succeeded him on the ancient Puru throne, and after Bharata, Bharatavarsa has been named. On this romantic love affair in the midst of sylvan charms and beauties and the desertion of the unsophisticated sentimental maiden by her lover have been the Sakuntala Upakhyaṇa (MBh. I, 62-74) and Kalidasa's famous drama Abhijñāna Sakuntalam. Bharata had three wives, by whom he had nine sons; but all of whom he suspected to be illegitimate as they were dissimilar to him in appearance. And they left the court and adopted priesthood in order to avoid court intrigue and persecutions. Bharata appealed to his ally and friend to Vaisali (Bessi = Vijji = Vaisya) king Marisyanta Dama, known as Marutta, being the grandson of Avikshit Marutta. Marutta gave Vidathin Bharadvaja, son of Bharadvaja, an illegitimate issue of their Angirasa priestly family who was brought by Avikshit Marutta, as the adopted son of Bharata. Mamata was the wife of Ucathya; they had a son Dirghatamas. Mamata was seduced by Ucathya's brother Brihaspati, and this irregular offspring of the union Bhavadvaja, being deserted by both the parents, was brought up by Vaisali royal family. Vidathin Bharadvaja did not succeed Bharata, but his son Vititha. But Puru domination did not last long. It was swept away by Ajamira Dacian (Dasa) conquests, known as

Pancalas. The last king of the Purus was possibly Hastin who established Hastinapur. The Puru Khatti (Hittite) hyper-brachycephalic crania with aquiline nose without any nasal bridge, known as Armenoid, have been found in Ansam (Parsa), Bianna near Agra and Adilnair in the south.

Dacian ruler Srinjay, grandson of Divodasa (bright Dasa), was helped by Parthava (Pahlava = Parthian) Abhayavartin Ohayamana who defeated the Vrichivans (Yadava Vrijivants) and gave Bharadvajas two wagon loads of damsels and 20 oxen for their assistance (Rv. 6.7.6-8). In Rv. (8.46.31,34) the gifts also of Prithustravas famous Parthava Kanita are praised. A Saka Parthian king Kanita is known in Greco Bactrian inscription and coin of 2nd century B.C. Against Sudasa's aggressive imperialism ten tribes, Purus (Sambarana), Druhyus (Druses = Durani Afghans), Bhrgus (Briges = Phryges), Kavasus (Sudra = Chudes), Yakāshas (Yuechi), Paktha (Pathans), Sambara (Sabara), Anus (Pakto Alpines), Ajas (Ikshvakus), Vaikarnas (Vehrkarnas), Matsya and Turvasas (= Tura, Yasna 46.62 = Turvazus) made a common cause. Visvāmitras became the priests of Sudasa, and Vasisthas of the confederate army. At first the confederates were successful; finding this unfavourable turn of events Visvāmitras took the sides of the confederates; and in turn Vasisthas led the Dacians. Before the confederates however could unite, the army of Sudas destroyed one by one all the confederate leaders and like autumn leaves scattered their army. And Sudas in gratitude of victory gave 200 cattle and 3 chariots yoked with horses to Vasistha, his son Satyati (Sakti) and his son Parasara (Rv. 7.18.16-32), borne by Sakti's wife Adisanti. The fierce Bheda (Badawi = Bedouins; Veddah may be also possible) submitted, but they were deprived of their possessions on the Yamunā. Yakshus (Yuechis = Takshakas = Tajiks) brought tributes of horses (Rv. 7.18.18-20). Dacian Pancala power was overthrown by the Kurus. Kurus belonged to the same Achæminidæ H(S)aka-manisya Cyrus, that is, of Saka descent. In Mbh Kauravyas are called Nagas generally, for the Sakas were Nāga worshippers. Kurus with the alliance of the Yadavas pushed themselves up to Prayaga. However Kaurava Vasu conquered the Yadava kingdom of Chedi, and dominated territories as far as Magadha. Vasu's eldest son Vrihadratha

became the founder of the famous independent dynasty of Magadha with Grivaraja as its capital. In the main line Kaurava Pratipa also extended his territory. Pratipa's son and successor was Rithisena (Rv. X, 98). Rithisena had three sons, Devapi, Santanu and Bahlika. Bahlika inherited his maternal uncle's kingdom—Bahlika (Balkh-Bactria). Devapi had skin disease. So Santanu became the Kaurava king. Santanu married Jahnvi, and had a son by her, Devabrata Bhishma. But as the Pandvas were becoming aggressive, so Santanu in order to consolidate his position wanted to form an alliance with the neighbouring Matsyas (Mediterraneans) and asked Matsya princess Satyawati in marriage. But Matsya king was not agreeable to this union unless the popular crown prince Bhishma renounced his rights to the throne in favour of the son of Satyawati. Bhishma made a solemn declaration abrogating his claims and even not to marry, in order to avoid future conflicts of succession, and on the condition Satyawati's son would be his successor. Santanu married her, and two sons were born to them—Citrangada and Vicitravirya. Satyawati had also another son before her marriage, Krishna Dvaipayana Vyasa by Vasistha Parāsara. Vicitravirya was married to Kasi princesses—Ambika and Ambalika who were abducted by Bhishma for his step brothers. Vicitravirya also died soon after marriage without living any issue like his brother Citrangada. Satyawati asked Bhishma to perform the levirate on his stepbrothers' wives. On his refusal Vyasa at the advice of his mother begat with Ambika Dhritarastra, Ambalika Pandu, and with a slave girl Bidura. Pandu became king as Dhritarastra was born blind. But either due to court intrigues, or due to blood pressure indicated by his sudden death during sexual union with his wife Mādrī, he lived a quiet life in a forest. Dhritarastra thus became king. Dhritarastra was married to Gandhārī, a very clever lady, daughter of Gandhara (Semite) ruler Suvala. They had four sons of whom Duryodhana was the eldest. Pandu was married to Yādavi Kuntī, sister of Vasudeva, father of Krishna, and a Madra (Cimmerian) princess. Pandu gave permission to his wives to have children with anybody they pleased; or anyway they had their sexual freedom, and freely they indulged in them. Kuntī

had a maidenhood son—Karna. Yādavas like all Alpines and Sakas were not strict in their sexual relation like the Aryans; they were fond of dances, drinks and free social intercourse. Madra (Marunda) maidens were famous for their beauty and physical charms. Madra maidens had the privilege of selecting their own mates. Freedom in love was their natural right. Savitri, daughter of Asvapati (titles of rulers of Madras and Kekayas) of Madra, selected Salva prince Satyavān as her husband as a tribal custom. And Savitri's mother was Malavi (Karkatanaga), and the principal god of the Madras was Yama (MBh, 3, 293). There was freedom in sexual intercourse of Karkata Naga women of Mahismati (MBh, 2, 81). Three sons were born of Kunti—Yudhisthira, Bhima and Arjuna; and of Madri two sons, Sahadeva and Nakula. They were known as Pāndavas. After Pandu's death Kunti brought the Pāndavas to Dhritarastra's palace at Hastinapur where they were brought up. Kauravas with their famous warriors attacked Pancālas. Drupada, son of Prishata of N. Pancāla, was defeated. N Pancāla was incorporated in the Kaurava empire. Dronācārya, the teacher of archery of the Kauravas, was made its viceroy. Dronācārya had also Pancāla Dācian blood in him as his ancestor Angirasa Gautama was married to Abalya, sister of the Pancāla sovereign Divodasa. Pāndavas claimed a share of the Kaurava kingdom. But not only their illegitimacy, constitutional difficulties were also raised. As Pāndu abdicated without any issue and Dhritarastra succeeded him as the reigning monarch, so Dhritarastra's children were the rightful successors. However a conspiracy was hatched to burn to death the Pāndavas and thus to bury for ever the Pāndava claims. The Pāndavas however escaped with Kunti. Pāndava brothers married Draupadi, daughter of Dācian Drupada of S. Pancāla in a polyandrous union. According to Bāhuvya, mentioned in Kamasutra, it was the Pancāla custom to allow a maiden up to five lovers. Sakas practised fraternal polyandry in order to avoid fraternal divisions of property and succession disputes. The founder of the Achæmenides (H(s)aka maniyaya) was Cyrus (Kurus). Kurus of Hastinapura were the kinsmen of Kurus of ancient Iran. In Yasna 33,4-5, Pourusista in marriage oath

answers: "Verily I love him. I will vie (with him in love), when fathers (fethro) give me away". Here Keinyo = Kanybhyo and Kahshmaibhya = Svāmibhyo = brides and husbands in the plural are used of vazyamnabhyo = who are being married. This clearly indicates that all the sisters as brides were married to all the brothers as husbands as among Todas, Khasas and among Tibetan tribes. That is polyandry and polygyny combined. When the Pandavas secured Pancala support and military co-operation, and Arjuna who was called a Parthava (Parthian) and was a friend and cousin of Krishna, and Krishna had a dominant voice with the Yādava republican confederacy, the Kauravas thought it wise to give southwestern part of the kingdom—Khandavaprastha. But the Pandavas could not enjoy it long though they for pasturage cleared the Khandava forest. Takshaka Asvasena (Tocharian Yucchi), Svangakas, and Maya Danavas were saved from the forest fire, and they befriended the Pandavas (MBh. 1, 229). Maya Danava, the architect of the Danava (Dānōi) built a splendid palace for the Pandavas (MBh. 2, 1.). Due either to court intrigues of Hastinapur or a defeat inflicted on the Pandavas (it is said through dice gambling which was a passion with the Sakas and Huns who even in the midst of victory played the game, often pawning themselves into slavery), the Pandavas were driven into exile for 12 years. But they were able to secure the military aid of Matsya Virāta by marrying Virāta princess Uttarā with Abhimanya, son of Arjuna and Subhadra, sister of Vasudeva Krishna. Pandavas also secured the martial support of S. Pancala, Cedi, Magadha, Karusa and particularly Yādavas whose archon Krishna became the charioteer of Arjuna. The charioteer's task was the most important part in the ancient warfare. The charioteer carried the commander-in-chief, the war bugle (Krishna had Pancajanya Sankha—five lobed conch, the war drum and standard), and by its dexterous driving led the army. If this commander's war chariot was destroyed, its standard lowered, or its bugle silenced, the army without any direction fell into confusion, became scattered or surrendered. Duryodhana was supported by all the northern states. Bhishma and Karna became the commanders-in-chief in turn with Salva of Madra as their charioteer. They met at Kurukshetra and fought

desperately, casting away war ethics and chivalry whenever it served their purpose. In this Dhartarastra proved to be refined rogues and shrewd diplomats; they kept the letters of the laws, but violated their principles. The Pandavas appeared to be rough and uncouth parvenus. However the Kaurava Pandavas became victorious in the decisive Kurukshetra war, fought perhaps in 7th century B. C. However all the sons of Pandavas were killed. Only Parikshita, son of Abhimanyu (Arjuna and Subhadra's son, nephew of Krishna) and Matsya princess Uttara of Virat, survived. Pandava brothers under the leadership of Yudhishthira and Arjuna ruled all over upper and eastern India for about 36 years. Then Yadava leaders in a drunken feud killed each other at Prabhasa. Arjuna went to Dvaraka, part of which was engulfed by a tidal wave through an earthquake, to bring the family members of Vasudeva Krishna. The journey took about seven months (Bhag. P. I, 14, 7). Arjuna was about 84. For Arjuna was 38 when he burnt the Khandava forest. On 16th year of his exile, Kurukshetra war was fought. Some of Yadava maidens were abducted on the way by the Abhiras (Avars). The Pandavas crowning Parikshita crossed the Himalayas. But in the ocean of the desert (valukarnava) in order to reach Meru (Meru; Vend. Mouru), possibly their ancestral home, one by one, including Draupadi, perished (MBh, 18, 1, 1, 2).

Parikshita was a great conqueror. And he had to wage war against the Takshakas (Tocharies—Tajiks) who revolted in the northwest, and was killed by them. Parikshita's wife was Madri and their son Janamejaya. Janamejaya waged relentless wars against all the Nrgas (Karkotaka, Sesa, Asvasena, Vāsuki), and particularly against the Takshakas whose capital Takshashila (Taxila) he brought under submission. He had as his ministers Indrota Daivapi Saunaka and Tara Kavashya (fired Mediterranean and Chude—Sudra). But as he favoured Yajñavalkya and antagonized the Kāśyapas, Kāśyapas artfully forced him to abdicate in favour of his son Satanika. Satanika's son was Asvamedhadatta. His son was Adhisimakrishna. His son was Nicaakshu who was forced to remove his capital to Kausambi from Hastinapur which is said to have been washed away by the Ganga (Gangā is likely to have been derived from

Mon Khmer *Kong*, Chinese *Kiang*=river; Me-Kong=mother-river, the name of the great river of Indo-China; Yangtze-*Kiang*=young kingdom river, the principal river (*Kiang*) of China. In E. Bengal *gang* means any river. So it seems that Purāṇic Mātā Gange=Mother Ganges is the literal translation of Me-kong). It seems that Kuru kingdom was split up. Abhi-pratarin Kakshaseni is mentioned as a Kuru king with Driti, Aindrata, son of Indrata Dvaitapa Sannaka as his priest (Ch. Up). Kakshasena was brother of Janamejaya (MBh. I, 91, 54). Svetaketu, his brother-in-law Kahoda and his son Astavakra were forced to migrate with Yajñavalkya to the courts of Janakas (kings) of Mithila (*Mithanis*) who became patrons of learning. It seems northern India was overrun by many Caspian and Alpine tribes (Nāgas speaking Paisaci language). Kambodas settled in Kamboja (Upamanyu in Rv. I, 102, 2. Kamboja Upamanyu is one of the teachers of Vamaś Bṛ. Kambojas (Iran. Kambojiya=Cambyases) of Rājapuram (MBh. 7, 4, 5); Asuras (Asuras=Assyrians), smelters of iron, have been found in with iron slags in Ranchi and Adaltnair; Kekayas (Bhrigus) and Madras (Marunda=Kinnara=Cimmeri) in N. Punjab; Khasas in Kashmir, sub-Himalayas and Kosala; Sakyas (Sakas) in Kapilavastu; Maurya Guptas (Moor Copts) in Swat and in Pippalavana (Mauriyas); Kathi (Kathai of Alexander; Kātha of Yajurveda and Kātha Up; Germanic Chatti of Tacitus; Gk. Kattoi; Egyp. Khet; Kratha of MBh. 8, 85, 10; In Germany Chatti, Hatti, Hassi are synonymous. The territory occupied by Hatti or Hassi has been called after them as Hesse. In Anatolia Hatti (Hittite) and Khatti were the same. These were called Purus Khatti who became Parsa Khattiya in Iran, Paru Kshatriya in Aryavarta. These Khattis are known as Chattis of U. P. K. and Ch. are interchangeable as Lakṣmi=Lakṣmi; Sindu=Hindu; Liccavis=Nicchavi of Kulika Bhatta; Nisobis settled in Mesopotamia and Iran after whom Nisobis towns were named; Abhiras (Avars) of Sind, Rajputana and Avanti; Mahāsena Canda Pradyota ruled in Ujjain; Kiratas (Kittas) in the Vindhya Hills; Parthavas (Parthians=Pahlavas=Pallavas=Vallavas=Pahlava, a northwestern tribe (*Dhīma P.*)=Pahnava. The territories of Indo-Parthians lay in Kandahar and Seistan, but

during the reign of Gondophare 20-60 A. D., it extended into Western Punjab and later into lower Indus. The Andhra king Gotamiputra claims to have defeated Pahlavas with Sakas and Yavanas. In the Junagar inscription of Rudradaman of 150 A. D., Rudradaman mentions a Pahlava minister of his, named Suisākha. Rudradaman waged war against his son-in-law Andra Palumayi II. Pahlavas penetrated into the south and replaced the Andhras, as Andhras ceased to be the ruling power in third century. The earliest three known records of the Pallavas are three Prakrit copper plate charters. Pallavas and Mallas ~~seem~~ to be allied tribes, if not the identical peoples. Pallava Narasimha Varman in his war with the Chslukyas whose capital he captured in 642, in his inscription of Vātapi (Vādāmi), bore the title of Mahāmalla. Another king Nandi Varman Pallava-malla (760 A. D.). Malla Nāgas became Nagar Brahmins, Newers of Nepal, Nayats of Travancore. The Alpine Nāgs included Sisunāgs (Pur. Sesanag; Sushinaka of Ansum and Susiana; Sees of Sogdiana; Hsiengau of the Chinese) of Magadha. Magadha itself is a Saka name for warriors. Maga (var. Mriga = Gk. Magas = Eng. Magi, the priest of the Zoroastrians) is the priest, Magadha is the warrior and Mānasa is the artisan without any distinction of caste, all worshipping the sun (Mihir) in Scythia (Saka Dvīpa: Vishnu P. 2, 6, 69-71). From the Sesanāgs spring also Sisuka Sailbhāhana, the founder of the Andhra dynasty; Sisadiyas of Mewar; Karkota Nāgs (Kara Kirghiz) of Kashmir; Mallas of Mālava and Kusinagara; Karkotas of Karkata. Nagar in Jaypur and Karkatas of Mahismati. Vasukis = Uzbeqs in the Vindhyās. Vakataka and Nava Nāgs were of Sesa Nāga origin. These Nāgs constitute the main factors of Nagar Brahmins. Though Kāyasthas (record keepers) have derived their name from Kitans, all the conquering tribes have left behind their administrative officers. Yet the Bengali, Orissa and Assam Kāyasthas have sub-names of Nagar Brahmins, Yakshas (Yuechis) of the Himalayan regions penetrated up to Vindhyās. Their other names were Asva Senas, Gandharvas, Siddhas, Vidyā-dharas. Majority of the Yakshins and Vetalas (Vitals of Kashmir - Ephthalates - Yetas (of Hunza Nagar) though mixed with the Alpines and Mongoloids show yet very fair complexion, auburn

hair, grey, even blue eyes. Kafir of Chitral have dolichocephalic head, blue eyes, auburn hair, and speak Khowar language, an intermediate between Avestan and Sanskrit. Their god is Amra (Amara) or Imra. Paisaci language was spoken by the Sesa and Karkota Nagas. Paisaji is found in the Naisik inscription of Pulamāyi; Kanarese Pisaru = infatuation; Telugu Pisa = folly. The Northwestern Asokan inscriptions were in Paisaci tongue. It is still spoken as a Shina dialect. The possession by Paisaci of L and R and the use of one nasal *n* which closely resembles Pāli is still preserved in Mālyi (from Malis = Karkota Nagas). The Bharasivas of Sesa Naga origin of Kantipur (Kantli near Vindhyaçalam where Vindhyaçaka ruler Vindhyaçakti 248-281 A. D. established Vindhyaçaseni temple) are perhaps referred to by Somadeva in his *Kathāsaritsāgara* as the source of Paisāci language. Gaṇapati Naga was also ruler of Malava. It is perhaps the Andhra ruler Hala (Sata-vahana) who replaced Sanskrit in place of Paisāci. Pāli is but standardized Paisāci. It is called the equivalent of Bhuta-bhāṣā. The Tibetans were called *Bhūtas* (Bhotias, Bhutias, a native of Bhutan). The Tibetans called their country including Bhutan as *Bhōt*. The higher plateau is called *Tō* (high)-*bhōt*, which has been anglicized into Tibet. Skt. *dūhita* = Ardh. Magadhi *dāya*, Prakrit *dhida*, Pāli *dhita*. *Khet* means clan in both Paisāci Shina dialect and in Assamese. *Uṣā* means to stand in Sindhi, Marathi and Assamese. *ai* (mother), *bai* (sister) are used a Kohistani, Gujrati, Marathi and Assamese. The god of the Yakshas was Kubera (Phoenician *Cabiri*, seven planets, Gk. *Kabeiroi*—mighty ones).

A man's half is his wife. The wife is her husband's best of friends. A wife gives him always good advices in all his needs and stands by him under all circumstances; like a sister at his dinner time, always solicitous of his wealth and welfare; like a mother in sickness by nursing him into convalescence; like a courtesan in the bed by affording him sensual gratifications. She is many in one. So more beloved (MBh. 1, 74, 39-44). Marriage of man and woman when each seeks the other is delicious like ambrosia; but the union when the woman covets the man who does not esteem her is noxious like poison (MBh 12, 821, 69). Anyone giving his

daughter in marriage to a man, unqualified, old, ignorant, poor, foolish, deformed, wrathful, foul-mouthed or impotent, is guilty of Brahmin murder (*Brahma Vaitarta P. Prakriti* 16, 81). He who sells his daughter for petty lucre goes to hell (same 18, 98; *Agni P.* 163, 1; 168, 28). Anyone abducting a married woman should be punished like a felon (*Garura P.* 95). A man is at liberty to marry a second wife in the event of his wife having had no issue within eight years of her wedlock (*Garura P.* 115). Wife can remarry in case of her husband's moral turpitude, ascetic life or impotence. The widow can remarry the brother of her husband, if living and willing to take her as his wife; if not she may marry any one she chooses (*Agni P.* 153, 5). A man loses his caste by taking many wives (*Agni P.* 188, 28). A man ravishing his female slave is liable to a fine of ten panas (*Agni P.* 261, 72). There are three kinds of wine, but they are not so intoxicating like a woman. Woman's love alone can intoxicate any man (*Agni P.* 358, 9). A husband having taken a concubine (*adivina*) in the life time of his wife should settle on her a *stridhana*, equal in value what had been settled on his wife (*Agni P.* 268, 30-36). Six kinds of *stridhana* form the separate property of a married woman: (1) *Adhyagni* (gifts made to the bride near the nuptial fire); (2) *adhyā vahanika* (gifts made at her leaving father's house for her husband's); gifts made by her husband, friends, parents, brothers (*Agni P.* 209, 22-27).

10.—DRAMAS

According to traditions priests and priestesses used to dance before gods in sex congress pantomimes. Previously sexual congress was the custom which was regarded as favourable to fertility of the plants, animals and human beings, and conducive to general prosperity. Later it was substituted by dance (*nritya*) which was pleasing not only to the gods but also to the worshippers. *Nritya* is pantomimic elaborate dancing depicting various amorous phases and moods of the gods.

Lasya nritya is the dancing depicting the languorous loving sentiments of the gods, while *tandava* and *rudra nritya* depicting the resentment, anger and fury. These phases were also displayed in puppet shows (marionette plays), their movements being regulated by pulling the threads by which the puppets were tied by a man from behind, especially where good dancers could not be had. Then appeared the regular *nāṭya*—drama—combining, dancing, songs, music and speeches. In the beginning the dramatic themes were confined to mythological heroes. Later it gradually became socialized, though generally it depicted the romances of the heroes. Already in the Rigvedic times we find that in the general festival gatherings of the people (*Samāna*, later called *Samāja* in Asoka's times) in the midst of general merriments when much meat and drinks were consumed, youths and maidens played heroes and heroines. Thus *Surya's* marriage (X, 95); *Yama Yami* (X, 10); *Urvashi Pururava* (X, 96); *Agastya Lopāmudrā* (I, 179, 4; I, 128, 7; I, 128, 8) were enacted. In the *Mahāvratā* rite there is a struggle over a round white skin between a white complexioned *Vaiśya* (Bessī) and a dark-complexioned *Sūdra* (aboriginal slave), and the prize falls to the victorious *Vaiśya* (*Kathaka Sam.* 24, 5; *Pancavimsa Br.* 5, 4, 10). In classical Sanskrit drama *Yavani* (Ionian female slaves who acted as body guards of the Maurya Gupta emperors and their successors) and *Yavanikā* (painted curtains) are known. At the back of the Greek stage there was either a mural painted scenery or a screen with a painted rude scenery was hung, representing a palace front or a temple. In the course of the Greek play there was scarcely ever a change of scene. Sometimes however a painted screen at either end of the palace was swung round, and presenting a fresh picture to the audience suggested a change of scene. There were mechanical devices of a kind of lift by which gods and goddesses could be carried as through from the sky. And a platform could be pushed forward on rafters from the interior as to bring in view a tableau of some murdered person or persons; for it was a rule that no violent death could be enacted on the stage. We find also *Gk. kalamos*—*Lat. calamus* (reed pen)—*Skt. kalama* (writing pen); *Gk. melan* (black)—*Skt. melā, mashi*—ink, *mala* (dirt); *Gk. puxinoi*

= Skt. pustaka = book. Aristotle in his *Polaitikhos* (4, 14) mentions that Sophocles raised the number of actors to three and added scene painting in dramatic representations. The sacred art of the Javanese *Wajang* employs life size marionettes, sometimes as many as 200 different types to the accompaniment of the orchestra, songs and the intonings of the players behind a thin white curtain on which spectators see reflected the pantomime of the shadows. The puppet theatre of the Japanese (*Joruri*) is highly developed. In the *No* dramas of the Japanese there are elaborate choruses, music, dances, but the actors put on masks. In the *Kabuki* theatres there are naturalistic presentations of actors and actresses. But actresses were often classified with courtesans though they cultivated acting as a family accomplishment. They developed wonderful grace and charms as actors and actresses. In the Chinese theatre songs and pantomime predominated. The Greek dramatic art was highly developed. It began at the Dionysic festival in Athens in 534 B. C. Thespic, leader of the chorus, stood apart from his choral following and in reply to their chanting uttered a pre-arranged patterns of answers.

Rig Vedic Plays.—Parents of the bridegroom to the neighbours :—Anspicious is the bride. Look at her. Wish her good luck. Now you can return home (Rv, X, 85, 88). Parents of the bridegroom to the bride :—Live here happily till your old age. Never be estranged. We pray that you may play with your children and grand children in your own home merrily and joyously (X, 85, 42). May you be always smiling and happy and be mother of heroes and beloved of gods; and bring prosperity to our bipeds (men) and quadrupeds (X, 86, 44). Neighbours to the bride : May you be the favourite of everyone. Heartily perform the duty of the house mistress in close concord with your husband. Be mother of children and rule this house till your old age (X, 85, 27). Husband grasping the hand of his wife : For good luck I grasp your hand so that with me as your husband you may live long. Bhaga, Aryaman, Savitar, Parandhi—the *devas*—have given you to me as a house-wife. Be the empress (dominate) over your father-in-law. Be the empress over your mother-in-law. May Prajapati give us children. Let Aryaman keep us fond of each other day and night (X, 85, 43).

O generous Indra, make this woman rich in children and fortunes. Give her ten sons and make me the eleventh (X, 85, 45). Husband and wife jointly in prayers to gods :—All ye gods and Apo (Av. Ahan, Advisura Anabita=Aphrodite, goddess of love and fertility=Aquarina, represented as a maiden with a jar of water of life=Kumbha yoni), unite together both of our hearts. O Matharivan, Dhatar and Dheatri, join us closely (X, 415, 47). Husband to wife : Make her most propitious, O Pushan, in whom men sow seeds. Ardently spread your thighs to enable me to push therein my *mentula virile* (*sapa* : X, 85, 37). Wife to husband : Ascend on my thighs, (I shall) introduce it with my fingers. Embrace your wife with an intense voluptas. Enjoyingly let us engender children. Let Savitar give you long life (Av. 142, 39).

Pururavas :—O my wife, tarry a while ; O cruel-hearted, we need to reason with each other. Otherwise in future we shall find no consolation. Urvasi :—What's the use of a talk ? I have left you like the first flash of the dawn. Return home, O Pururavas. Harder than wind it will be difficult for you to capture me (Rv. X, 95, 2). Whenever serving my father-in-law with food or drinks, at night or day, if desired by my lover, I returned to the inner chamber and enjoyed copulation with your vigorous *virga*. Thrice daily with your *verge* (*vetasa*) you used to give me such gratification that I ceased to have further longing for it. I always heartily yielded to your desire ; O Pururavas, you were the lord, O hero, over my body (X, 95, 4-5). Pururavas : You had smiles like lightning flash. You used to give me voluptuous moistened orgasms. You are now bearing a baby. So give it long life by nursing it (X, 95, 10). Urvasi :—You have impregnated me and begot a child for the inheritance of your kingdom. I know and warned you often. But you did not listen to me. What's is the use of saying these now when you cannot have me any longer (X, 95, 11). Pururavas : When will the son, that will be born come to his father ? And if it comes, will not cry and weep ? Whoever separates a loving pair (*dampati*) sets fire in her father-in-law's house (X, 95, 12). Urvasi : I answer you. It will not cry or shed tears. It has my blessings. I shall send you what you have begotten in me. Now return home, O fool, and do not desire me (X, 95, 13).

Pururavas :—Let your lover fall down today never to rise again ; that will keep him far away from you. Let death be his embrace, and voracious wolves devour him (X, 93, 14). **Urvasi** :—**Pururavas**, you should not commit suicide or hasten death. Let not the terrible wolves eat you up. With women there can be no lasting friendship ; they have the heart of hyenas (X, 95, 15).

Yāmi :—To be united with you into an intimate embrace I shall hasten to the further ends of the lands or the sea so that a grand child of our father is begotten (Rv. X, 10, 1).

Yama :—Your friend desires not this intimacy (with you). Though sprung up from the same origin, he regards you indifferently (for conjugal union. Nor is this place secluded). Sons of the mighty divine heroes (gods), supporters of the heaven, can see far and wide (X, 10, 2). **Yāmi** :—The immortals (gods) more so desire that mortals should have progeny. So heart to heart let us be closely united, and like a husband go into the body of your wife (X, 10, 3). **Yāmi** ardently passionate makes her *Yonī* his bed like a wife exposing herself to her husband, so that like chariot wheels we can make (copulatory) movements (X, 10, 7).

Yama :—May be there will come a future age when brothers and sisters will be united. Like me, select another husband and unite with that bull, and make your arm, O lucky one, his pillow (X, 10, 10). **Yāmi** :—Is he a brother in spite of whom (sister) becomes helpless (*anābhā*). Is she a sister if in spite of her, her brother suffers in fortune ; with passionate urge I say, let your body be closely united with mine in intimate embraces (X, 10, 11). **Yama** :—Your body will not be embraced by me. Copulation with sister is sin. As with me, enjoy *vakeptas* with another. Your brother desires it not, O lucky one, from you (X, 10, 12). **Yāmi** :—You are a weakling, **Yama**. You have neither heart nor will. As a horse is easily bridled, as a creeper fastens round a tree, so will another woman (easily) embrace you (X, 10, 13). **Yama** :—Embrace another, **Yāmi**, and let him as a creeper fastens round a tree enfold you ; win his heart and let him win yours ; and he shall make you happy in delightful unions (X, 10, 14).

Lopāmudrā :—Neglected by my bull (husband), **Kāma** (sexual desire) has overpoured me, thrilling my every organ. **Agastya** : Impatient **Lopāmudrā**, enjoy now your steady man who will remove your tension (Rv. 1, 179, 4). **Romasā** :—Mount up :

embrace me closely. I am voluptuous in venery. My (pubic) region is covered with hair like that of the lamb of Gandhāra (Rv. 1, 26, 7). Bhāvayavya :—This insatiable and unquenchable woman like weasel moistened with orgasm is giving me in her ardent embraces a hundred gratifications (Rv. 1, 128, 6). In Sanskrit drama a curtain was lifted at the commencements of new scenes, with a painted scenery at the back of the stage. In Patañjali Mahābhāṣya (2, 36) Kamsavadam, the Granthikās (reciters) divided themselves into two parties; Kamsa partisans had blackened faces and Kṛṣṇa partisans had reddened faces. In Rāmāyaṇa (1, 4, 9; 2, 27, 15; 2, 69, 4) and MBh (1, 51, 15; 1, 219, 4; 1, 208, 10; 2, 88, 49; 2, 12, 36; 3, 15, 18; 3, 20, 27; 3, 38, 12; 4, 15, 32; 4, 22, 3; 12, 69, 60; 12, 295, 5) dramatic performances are mentioned. The Aryan Ikṣhvāku (Aśvama) reached N. India through Kailāsa from Oxus (Par. *Vakṣh*—Av. *Vaksh*) Sarayu-Kali defiles and gorges about 10th century B. C. The Aryans reached Media and Demavend (Kāśyapa) in ninth century B. C. Assyrian ruler Salmansar in 835 B. C. mentions Amadai (Mada), Parsuas (Parsa), Pārthava and Patishuvara (Behi—O. P. Baga—Rv. Bhaga—Sanskrit inscription; *pāti*—lord; *shvara*—Skt. *avar*—O. P. *hvara*—Ar. *svara*—Pers. *Khwar*); the region between Demavend and salt desert. It is a pure Aryan word, and not Iranian where *S* is pronounced as *H* and *V* as *P*. The Gāthas of Zarathuštra, the contemporary of Vitaspa, father of Darius (515 B. C.) resemble closely Rigvedic Suktas in meter and grammar. The compilation of the Rigvedic hymns of the south-eastern branch cannot be much earlier. The Purāṇic chronology by calculating the collateral lines of ruling dynasties has added to the confusion and has made Vedas appear as very old. Atharvaveda may have been compiled not later than fifth century B. C. as Uddalaki Svetaketu's name is found as one of its composers. Svetaketu was a contemporary of Apastambha. Śukla Yajurveda was compiled by Yājñavalkya Bhṛamarathi, called Vājāsani, hence called Vājāsanya Samhitā, who was not more than one generation older than Svetaketu. Kṛishna Yajurveda, a compilation by Taittiriyas (Tatars), known for that reason as Taittirīya Samhitā was of the same age—the second half of the sixth century B. C. Prithuśravas Kāṇita (Kāṇita, the glory of Pārthavas) gave Vasa-Aśvya 50,000 horses.

10,000 kine and twenty hundred camels (*usātra*); fleet steed who swiftly turn the wheels of golden chariots of the famous prince (Rv. 8, 46, 21-24). Vasa gathers a large amount of spoils by defeating the enemies of the Prithvaravas (Rv. 1, 116, 21). Samrat Chayamana Abhayavartin of Parthavans (Parthians) in alliance with the Daclans (Srinjayas) became victorious and made generous gifts (Rv. 6, 27, 8). There was a Saka Parthian ruler Kanita whose coins in Greek letters have been found of second century B. C. Dramas are of various kinds. Nataka centres round the romance of of mythical or historical heroes as Dnyanta and Sakuntalā, Udayana and Vāsavadattā. Through love should be principal theme, it should masterly show all other sentiments and passions. *Prakarana* is a social drama as Mālati Mādhava. *Vyayoga* is one act comic (*hāsyā*) play, though there may be some erotic sentiments, but very few females. *Prāśana* is also one-act farce, having comic as its principal object, but rather of vulgar type. *Anka* is also one act drama with dominant pathetic (*karuṇā*) sentiments as in *Karuṇā Kandala*. Tragedy is unknown.

Kālidāsa refers to Bhāsa, Saumila, Kaviputra (Rāmila; the works of Kaviputra Saumila and Rāmila have not yet been found; *Malavikā Agnimitra* prologue) as famous ancient dramatists, and he himself is but a beginner (*Sakuntalā* prologue). Bhāsa's *Pratijñā Yaugandharyanam* and *Svapna Vāsavadattam* are excellent plays, naturalistic, yet full of life and vigour. Udayana of Vatsa has gone on hunting. The queen mother at Kausambi palace intends to send to her son a ribbon, prepared by all married ladies. But before it could be sent, the news reached Yaugandhāra that Udayana was captured by the army of Mahāsena Pradyota of Ujjainī and was taken to his capital as a prisoner. Udayana was fond of capturing elephants. Knowing this, Pradyota, king of Avanti, placed a wooden elephant full of armed men on the Narmadā in the frontier. And by a spy Pradyota had announced to Udayana that a very pretty elephant had been roaming in the forest. As Udayana believed the story and was approaching alone, without any suspicion, the wooden painted elephant, he was captured by the armed men hidden within the elephant. Mahāsena in his Ujjainī palace, attended by Abhira servants, is discussing with his queen Angaravati

about the marriage of their adolescent girl Vāsavadattā who was taking music lesson in lyre playing from a lady teacher. At that time it was announced that the Vatsya king Udayana, his formidable enemy, was captured; and with him his ancestral lyre Ghoshāvati. Pradyota says that his eldest son Gopālaka is only interested in politics, and younger son Palaka in athletics, he ordered Udayana's flute to be presented to Vāsavadattā. Yaṅgandharāyana goes to Ujjain to try to rescue his master. Vāsavadattā becomes the pupil of Udayana in music lesson and both of them elope to Kausambi easily by the clever arrangements of Yaṅgandharāyana. Svapna Vāsavadattam is the best of Bhāsa's plays. After eloping with Vāsavadattā and marrying her, Udayana neglects his state business. Pradyota Mahāsena to wreak revenge for thus being robbed of his beloved daughter by his enemy sends his general or ally Aruni to invade Vatsya territory. Vatsya ministers thought that the only way to save Vatsya territory from the terrible army of Mahāsena was to make an alliance with the powerful Magadha kingdom. And that could be arranged only by marrying beautiful Padmāvati, sister of Magadha king Darśaka (son of Ajātasatru; Ajātasatru's father Bimbisara and Mahāsena Pradyota were allies and friends). But Udayana was madly in love with Vāsavadattā, and her love was the whole universe to him, and he did not care for anything else. So the ministers took Vāsavadattā into their confidence, and Vāsavadattā agreed with the ministers that it was the only way to save Vatsya territory. One day while Udayana was in a hunting trip, the royal pavilion in which Vāsavadattā and Yaṅgandharāyana were staying was burnt down, and the rumor was spread that the premier and the queen of Vatsya perished in the flame, though they really travelled to Magadha, disguised as pilgrims. Padmāvati was on visit to the queen mother in a country place. There Vāsavadattā is placed under the protection of Padmāvati by Yaṅgandharāyana. And it was announced to Padmāvati and her companions that a great fire had burnt the queen of Vatsya, and Udayana was overwhelmed with grief. He wanted to commit suicide. Pradyota sent an ambassador to Magadha king Darśaka, asking for his sister Padmāvati for his son (Gopālaka). But Padmāvati is betrothed to Udayana as she did not like the Ujjain

prince. This thrilling news is brought to Padmāvati when she was playing ball merrily with Vāsavadattā and other ladies near jasmine bower. And Vāsavadattā was asked to make the wedding garland of flowers. Padmāvati has had headache. Udayana goes to his newly married wife in the *Samudra Griha*. But finding her not there and waiting for her he falls asleep on her bed. Vāsavadattā goes to nurse Padmāvati; and taking Udayana to be Padmāvati, in half-lit room, she rests on the bed and finds to her astonishment that it is her beloved Udayana; and Udayana in his dream is mentioning her name. Udayana half-awakened by her presence sees her vision. Both of them talk to each other. Vāsavadattā slips away. Udayana rushing after her struck against the panel of the door. After this dreamy vision, the play has been called *Sapna Vāsavadattam*. While Udayana has returned to Kausambi with Padmāvati, Vāsavadattā's mother Angarāvati sends a painting of Uddayana and Vāsavadattā while they were at Ujjain with a Vāsavadattā's nurse, saying that Udayana was as dear to her and to her husband Mahāsena as Gopālaka and Pālaka, and Mahāsena's army had driven away the invaders of Vatsa territory. Padmāvati to her surprise finds that the portrait of Vāsavadattā closely resembles her companion, entrusted to her care. When Vāsavadattā and Yaugandhīrāyana appear, the reason of their strange behavior is revealed. Bhāsa's *Daridra Cārudatta* is but a fragment of the whole play (only first 4 acts have been found) upon which Sudraka's *Mrichchakatika* has been based. Cārudatta is an impoverished, but an honest and generous merchant of Ujjain; Pālaka, son of Mahāsena, is now its king. Aryaka, son of Gopālaka, is captured in an Abhira settlement and imprisoned by Pālaka. Pālaka's brother-in-law is a characterless libertine. He wants to love Vasantasenā, a refined romantic courtesan of Ujjaini, but she repulses him as unworthy of her attention. He pursues her. She takes refuge in Cārudatta's house, and deposits her jewellery in Cārudatta's custody. A lover of Vasantasenā's maid burgles Cārudatta's house, takes away the jewelry to his beloved in order to manumit her with it. The maid identifies the jewellery as that of her mistress, and scolds him for such a cowardly act of his, and asks him to return the jewels to Vasantasenā on behalf of Cārudatta. Vasantasenā overheard their

conversation, and sets her maid free and allowed her to marry her lover. Cārudatta finding that the jewels entrusted to his custody had been stolen sends the pearl necklace of his wife to Vasantasenā as a compensation for the jewels which he said he gambled and lost. Vasantasenā's dwelling is magnificent and luxurious. There are numerous courtyards; garden houses and surrounded by gates within a vast enclosure. There ends Yāsa's Cārudatta. Vasantasenā goes in the evening to Cārudatta's house to thank him. But as it was a stormy weather, she stayed one night there and it was arranged that she shall go to Cārudatta's garden house in his carriage in the morning and have a pleasant picnic there. The carriage was at Cārudatta's door. But Aryaka, son of Gopalaka, escaping from Pālaka's prison, entered into it. The driver thinking that it was Vasantasenā drove off, while Vasantasenā thinking that it was Cārudatta's carriage entered into the vehicle of Pālaka's brother-in-law in a hurry to meet her lover in the tryst. Cārudatta's carriage was challenged on the crossroad by a sentry, and the driver said that Vasantasenā was within. However it was his official duty to inspect it; but to his surprise he found that Aryaka whose escape was announced was within. Aryaka begged his mercy. So he said to his companion sentry that it was Cārudatta's carriage and Vasantasenā was within. But the other fellow wanted to have a look to assure himself as he first had said Mr. and then lady Vasantasenā. But the former sentry resorted that as he knew the languages of Khasas, Khattikhāras, Kharathis, Kiratas, Karmātas, Karnapravarnas, Draviras, Cholas, Chinese, Barbaras, Kheras, Khanas, Mukhas, Madhughatas, he could not make fine distinctions of genders. Cārudatta to his astonishment found Aryaka in his carriage, instead of Vasantasenā for whom he was eagerly waiting. Cārudatta allowed Aryaka go to his Abhira friends. Pālaka's villainous brother-in-law found to his utter unexpected delight Vasantasenā in his carriage. But no amount of inducements or threats could persuade Vasantasenā to change her mind to be friendly towards him, what of clasping him within her arms. So she was strangled and she fell unconscious. Thinking her dead he lodged a complaint against Cārudatta for killing Vasantasenā for her jewels. Circumstantial evidence was against

Cārudatta, and he was ordered to be executed. But Vasantasenā was revived by a Buddhist monk who took her to a monastery to be nursed. When in a convalescent state she heard that Cārudatta was sentenced to death for her sake, she hastened to the execution scene, and thus Cārudatta was saved. In the meantime Pālaka was dethroned by a revolution headed by Aryaka, supported by the army of Udayana. Aryaka became the king of Ujjaini and he made Cārudatta his minister. Later by other revolutions both Aryaka of Ujjain and Darśaka of Magadha were dethroned, and Udayana managed to occupy the thrones of Avanti and Magadha in addition to his ancestral Vatsya. Consolidating these states into his empire, he made Pataliputra his imperial capital. Udayana for his numerous love affairs became known as Kāmāsoka. Sudraka, known also as Indranigupta, is said to have been a king displacing Svati (Sivasvati, his son as prime regent, *Mricchakalika* prologus). Sivasvati, the Andhra king, lived about 312. Kathasaritsagara calls him king of Bahāvati. In *Viracaritra* Sudraka is described as the friend and co-regent of Salivahana at Pratiethanapura and when the Salivahana king tried to overthrow his influence, Salivahana king himself was overthrown, and Sudraka became the king. In *Vasas Avimāraka* mentioned in *Kāmasutra*, Vishnusaena lived in Kuntibhoja in disguise as a Candāla. For killing sheep he was known as Avimāraka. One day he rescued Kuntibhoja's daughter Kurangi from an infuriated elephant. Both of them fell madly into love with each other. For his caste Avimāraka could not be expected to marry Kurangi, and Kurangi's father even forbade Avimāraka to see her. Avimāraka in despair thought of committing suicide. But some how they managed to meet each other. And their love triumphed. Kuntibhoja was obliged to arrange marriage of Kurangi publicly with Avimāraka.

Kaumudimahotsava was enacted at the coronation of Kalyāṇa-Varman of Pataliputra. It is attributed to Vijjikā, wife of Candraditya, son of Pulakesin II, mentioned in *Nerur* and *Kochre grants*, dated 559 A. D. Vijjikā no doubt was a great poetess. But it seems that the drama was composed by one Vajjikā, perhaps, a Licchavi woman. Candra Sena (Chandra Gupta, commander-in-chief of the Andhras, usurped the throne with the help of Licchavis, killed the Andhra ally Maukhari

ruler Sundaravarman. When Candra Sena became king, Mantragupta, the minister of Sundaravarman, brought Sundaravarman's minor son Kalyāṇavarman at Pampā in the Vindhya. Kalyāṇavarman's nurse Yogasiddhi became the nurse of Saurasena king Kritṭisena's daughter Krittimati who with Yogasiddhi went on pilgrimage to Vindavasini on the way at Pampā. Krittimati met Kalyāṇavarman and they became infatuated with each other. Yogasiddhi recognized Kalyāṇavarman. In the meantime Kalyāṇavarman became a feudatory chief. Krittimati with the consent of her father sent the marriage proposal to Kalyāṇavarman who was indeed too glad accept it. The authoress calls Candra Sena Karaśara and even the Liccavis as Mlecchas. Avimarśa and Kurangi (8, 15) of Bhāsa are mentioned as well as Dattaka, Ganikaputra and Muladeva.

Viśakhadatta is the son of Prithu Maharaja (Chohan Prithivi Rai of Ajmere), grandson of Samanta Vatsavradatta. Mudrā Rākṣasa and Devi Candragupta, both political dramas are ascribed to him. Yasovarman, of Karkotakanaga dynasty, wrote a play—Rāmabhadraya—in 6 acts, mentioned by Abhinava Gupta in his commentary on Dhvanyāloka and by Śāradātanaya. Iran and Bhateri inscriptions show that Candragupta II was the son of Samudragupta by queen Datta Devi (lady of the Datta clan). It is very likely that Prithu Maharaj, father of Viśakha Datta by giving his sister or daughter Datta Devi to Samudra Gupta in marriage got himself elevated as Mahārāja. In Devi Candra Gupta it is mentioned that Dhurvadevi was with her husband (Rāma Gupta) in an expedition against the Saka ruler of Giripura (Girinagara=Junagar). And Rāmagupta was asked to surrender his wife Dhurvadevi to the Saka ruler as a war booty. Candra Gupta was against this policy. He entered into the enemy camp when the Saka ruler was dallying with Dhurvadevi in the guise of a theatrical party, killed the Saka chief, rescued Dhurvadevi, and married her and made her chief queen, possibly after his brother Rāmagupta's death. Harsa Caritra mentions that while the king of Sakas was courting another man's wife, he was butchered by Chandra Gupta, concealed in the costume of his mistress. The mention of Huna in Mudrā Rākṣasa (5, 11) indicates that Viśakhadatta composed Mudrā Rākṣasa in the reign of Skanda Gupta who

expelled the Huna attack in the 455 A. D. Visakhadatta seems to be therefore a contemporary of both Candragupta and Skandagupta.

11.—THE ECONOMIC LIFE IN ANCIENT INDIA

Sudra-Chudes: Nandas uprooted all the vassal kings, centralized the government. "Brahmans will address Sudras (Chudes) as lords (Arya); but Sudras will address the Brahmans contemptuously with so (thou: MBh. 8, 188, 39)." "Sudras occupy better seats in the midst of Brahmins, and Sudra rulers insult the latter. Brahmins honour the Sudras with flowers and other auspicious presents. Through thus honoured, Sudras do not care to favour the Brahmins even with a kind glance. Brahmins do not dare to enter the houses of Sudras, but stand at their gates to pay respect to them (Kurma Purana 1, 29, 17-23)." According to Katha Sarit Sagar, Vararuchi was the minister of the last Nanda ruler. And Katyayana, commentator of Pāṇini married Upakośā, daughter of Upavāsa, brother of Varsa who had Pāṇini as his pupil to study grammar. A priest, the chief police and a banker of Pataliputra tried to seduce Upakośā, but she by her wit brought it to the notice of the Nanda monarch who punished his ministers with justice and impartiality. Maurya-Guptas (Moor Coets = Egypt. Gabt = Gk. ai-Guptos) who overthrew them followed the policy of the Nandas. Instead of subordinate kings they divided the country into provinces which were ruled by governors. Junagar inscription of Rudradaman records that Surashtra was governed by Rastriya Pusyagupta who for irrigational purposes formed Sudarsana lake by damming a stream between a citadel and a rock. This lake was improved by Yavana Adhithāya Tushlāpa (appears like an Iranian name: Alexander himself married the daughter of Darius and had 10,000 of his officers wedded to Iranian women), governor appointed by Asoka who is said to have been his brother-in-law. Not only the government was centralized, private ownership of land was abolished; mines, basic industries, forests, sea-fishing, ferries, transports and salt-manu-

facturing became state monopolies. The land was hired to the cultivators on the basis of good upkeep, productivity and $\frac{1}{4}$ produce rent. Tax was levied on the goods brought to the market for sale. Merchants had to pay a license fee. Big businesses were under the trade guilds who had to deposit securities of money to the state and were under the supervision of three state officers. This intricate administration work was run by permanent trained officials (*rajukas*—record keepers). To keep watch over them, to report to their efficiency or corruption, the country was overran by spies in different guises, and in which courtesans took leading parts. The army administration was no less efficient. It had six divisions under separate commanders, united under a supreme commander-in-chief, who was the ablest nearest relative of the king. There were liaison officers under the supreme commander who brought co-ordination between the different fighting units. The navy (*nav*) consisted of many vessels which patrolled the sea coast, rivers and harbors and river ports. There was a commissariat department to bring them food, clothings, sailors, soldiers, fighting equipment. There was a superintendent of bullock caravans for transporting food, animals for meat, fodder for animals, fighting equipment, and accessories. There were caravansaries all over the country for the accommodation of travelling soldiers, with stables and fodder for horses, bullocks, chariots and elephants under a separate commander. Foot soldiers were under a different commander. There were one archer, one lancer and one charioteer in every chariot. But chariots on march were carried by bullocks, and not by horses, to spare them the fatigue, so that during fights they can draw these chariots with full vigour and energy. The elephants without bridles carried a driver and three bowmen.

In Lumbini Pillar inscription Asoka inscribed : "Worshipped by king Priyadarain, and beloved of the gods, anointed 20 years, coming himself, because the Buddha Sakya-muni is born here, the crowning stone figure of young elephant on the stone pillar has been caused to be made and set up. Because the Blessed One is born here, Lumbini village is made exempted from other taxes and is to pay only $\frac{1}{4}$ of its produce." It seems therefore there were other taxes besides produce rent. The provincial governors had to act on the

advisory council (*parisad*), consisting of high administrative officials. The king himself had to act in concert with his ministers (*mantri-parisad*), composed of representatives from the ruling and governing families. Asoka in his sixth Girnar edict announces that "whatever orders I verbally give to the Dapakas or to the Bravapakas to be proclaimed or whatever is imposed upon the Mahāmātras, if there is any division or rejection in the Parisad, it should be brought to my notice at once. I am never tired in doing business. To do good to the world is my primary duty". Mahāmātras were administrative officials. In the third rock edict, Mahāmātras are identified with Pradesikas (Pradestri of Artha sāstra). The country was divided into 4 or 6 provinces over each of which there was a governor or viceroy (Yuvaraja). Each province was divided into many divisions (pradesa), consisting of Sthanikas (police and military stations). The divisional chief was known as Pradesika. Pradeshtkas were provincial administrative officers; Rajjukas as central administrative officers, and Yutas (Yuktas) were revenue collectors and treasurers. In Girnar text Asoka announces: In samajas (festive gatherings with songs, dances, theatres, military displays. MBh. 1; 184), no animal shall be sacrificed. Formerly in the kitchen of king Priyadarsin, beloved of the gods, many animals were daily killed for the meat curry. But for the same purpose only three animals are daily killed—two peafowls and one deer, the deer however not invariably. Even these creatures shall not be killed afterwards." "Throughout the domain of king Priyadarsin, beloved of the gods, so, also in the neighbouring territories, such as Chola (Cavery region with Kanchivaram), Pāndya (Madurā region), Salyaputra (Satiya = S. Canara - Travancore), Kalalaputra, (Malabar Kerala as far Tāmrāparni, the Greek king named Antiochus—everywhere king Priyadarsin, beloved of the gods, has arranged for medical treatments both for men and animals. The medicinal herbs that are beneficial to men and for animals have been caused to be supplied and planted whenever these are not to be found. Plants supplying medicinal roots and fruits have been supplied to be planted where they are not available. On the roads, wells (and the like) have been excavated, and shade trees planted for the enjoyment of men and animals. In the

Kalsi text it is for inscribed: Verily the beloved of the gods wishes all living beings non-injury, contentment and toleration. The conquest by sympathy and love he regards as greatest glory. This has been achieved by the beloved of gods throughout as well as among all the neighbors over a distance of 600 kros, namely the Greek king Antoka (Antiochus Theos of Syria 261-146), Antekina (Antigonos Gonatus of Macedonia 276-239), Turanaya (Ptolemy Philadelphus of Egypt 265-247), Moga (Magos of Cyrene 300-250), Alikasundara (Alexander of Epirus 272-23 or Alexander of Corinth 262-214), Geras, Pandyas and even Tamraparnikas (in Tinnevely, likely extending to Ceylon); so also here in the king's realms, among the Yaunas (Ionians settled in Babylonia, Iran and Bactria), Kambojas, Nabha (Napeikai of Pabsien near Kapilvastu who migrated and settled in Nabha in the Panjab, Nābhadesabha of Purāṇas), Bhojas (Vrishni), Panti (Patnala), Andhras, Paradas (Dards); everywhere moral instructions are being given as among frontier (Aparānta) people. In the Siddapur edict Asoka addresses himself not only to the governors, but also through the governors to Mahāmātras. In the Junagad edict he asks the governors to communicate his commands to Mahāmātras. In the third minor rock edict of Yerragudi he asks the Rājuka (land surveyor with rāja-rope, kuru damma jot-important functionaries and record keepers) to instruct the people of Ratthika (Arattas-Urattas-Rattas-Reddhi), Bhoja (Vrishni Bhoja of Girnar), Piti-nikas (Faithan on the Godāvari) respect their parents, to cherish love towards all people and to speak the truth. In the seven pillar edicts Asoka announces: "My Rājukas are placed over many hundred thousands of human beings. My Rājukas are appointed for good and happiness of the people. They being fearless and confident should carefully hear every case and pass sentences; even of those who have been imprisoned or sentenced to death." "These creatures are declared inviolable by me, announced in the 26th years of my reign, namely; parrots, mainas, cranes, Brahmany ducks, wild ducks, wild geese, nandimukhas, gelatas, bats, pipilikas, terrapins, shrimp, eels or silurus boalis, gangapupputas (gulls), Samkuja fish, Kaphatasyakas, leaf hares, Barasing stags, bulls set free, Ukkapinda (cats), rhinoceroses, white pigeons. Those she-goats and

ewes and sows with young or in milk are inviolable and also their young ones within six months of age. No cocks are to be caponed." "This Banga cave (Barabar Hill cave inscription = Gorathagiri Lomasa Rishi cave 257 B. C.) is given to the Ajivakas by king Priyadarśin, announced in the 12 year." This cave in Khatika (bald-headed = Ajivakas) is given by me to the Ajivakas for retreat during the heavy rains."

"And for this purpose the edict of the law of the love is written in order that my sons or grandsons will not think on other new conquests as worth achieving. Let them conquer instead by arms though love and sympathy."

Asoka marked the boundaries of his realm with inscriptions. One has been found at Maneera 15 miles north of Abbottabad; the other at Shahbaggari, 40 miles northeast of Peshwar; one at Kalsi in Dehradun Dt.; another at Lambani Garden in Nepal; possibly these were the northern boundaries. In the west there are inscriptions at Girnar near Junagarh; another at Sopara, 37 miles north of Bombay. Three minor rock edicts have been found in Chitaldury Dt. of Mysore and at the south at Yerragudi in Karnool Dt. So in the south Asoka's domain was surrounded by Chola, Pandya, Kerala and Satiya (N. Canara) kingdoms. Andhras dominated the Godavari region, Ratthikas (Urartus = Arattas, Rattas, Raddhis) and Andhras of Paithan and Bhojas of Kathiwar. With the Maurya Gupta period, especially under Asoka we find highly polished round monolithic shafts with well executed spirited animals like bull, lion and elephant or elaborate capitals, resembling the Egyptian, Babylonian and Assyrian animal standards.

Arthashastra of Kautilya seems to be the political treatise and legal code of Maurya Guptas. Though the book is traditionally ascribed to Kutila (gotra name) Vishnu gupta of Pushkalsvati, the prime minister of Maurya Chandra Gupta to whose organizing genius, Maurya empire was established, overthrowing the powerful Sudra (Chandas) Nanda dynasty, it appears to be a later compilation of the Kautilya school. For in Arthashastra (2.11) we find mentioned *cinapatta*, that is China fabric or silk; beryls, corals of Alakanandaka (Alexandria) and Vaivarnaka (Bobium, a coral fishing port near Genoa). In 246 B. C. the Chin ruler of northwestern province Chin shih Huangti (First

Emperor) unified all the 36 provinces by a central government, abolished the feudal system by deporting all the feudal lords into one northern territory, and to defend the border against the the Hsiang nu built the great wall, possibly at the cost of a million lives; and possibly after a century the Flowery Kingdom began to be known to the outside world as China after the great Chin emperor. Red corals (*corallium rubrum*—*taktam padma-rāgaṃ pravṛta*) are chiefly found in the Mediterranean regions and only traded in Roman times into Malabar ports. Beryls (*vairuḥya* or *vaidurya*=from very far; Ar. ballar=Gk. beryllion=Lat. beryllus), an emerald, possibly of Ceylon, Krimitāna (As. 2, 23-23) is the silk worm filament. Silk worm was introduced in India not earlier than second century A. D. from Persia and Khotan which they obtained from China in the first century. Satina, Nalatula and Vrittapuchcha are mentioned as the furs of *audra*, that is, aquatic animals (As. 2, 11). Possibly they are the furs of beavers, otters and seals. Though the Achæmenides appreciated the beaver furs with which they clothed Advisura Anahita, it was rare. It was only in Roman times for the luxury of their dames, there was trading in these furs. But Arthashastra mentions many economic factors, especially as to the weight of punch-marked coins, even of pre-Maurya times. However it generally deals with the Maurya period of which it is the most valuable compendium.

The source of Revenue: The treasurer (*samāharta*) shall collect the dues from the fortified areas, the rest of the country, mines, state buildings and gardens (*śatru*), forests, herds of cattle (*vraja*), and transit duties on merchandise (*śanikapatā*). Tolls (on market sales), fines (on criminals and for breach of laws), sale of standardized weights and measures (manufactured by the government of iron or stone; when manufactured by licensed corporations, 4 masha was charged for stamping them with the state seal. A fine of 27½ panas was imposed for using unstamped measures and weights: 2, 19). Taxes on municipalities (*nigataka*), mintage of coins, issue of passports, drinking saloons, abattoirs (*śind*), manufacture and sale of gold and silver ornaments (*śauvarika*), warehousing of merchandise, taxes on prostitutes, gambling, sale of building sites (*vastuka*), taxes from trade guilds, religious corporations and the gate fees of the

towns are known as incomes from *Durga*. Produce from the state lands, produce rents, taxes on religious performances, money rents, traders' license fees, ferrying charges, passage money on ships (*ndra*), port dues (*pattana*), road cess, land settlement dues (*raja* with which land was measured), fines on criminals are the state (*rastram*) incomes. Gold, silver, diamonds, gems, iron, and pearls, corals, conchshells, salts, and other minerals extracted from the land are the sources of the state incomes. Income from flower, fruit and vegetable gardens and from fields where tubers are grown is known as *setu*. Game elephant and timber forests are the sources of the forest income. Cattle, water buffalos, goats, sheep, asses, camels, horses and mules are the sources of *Brāja* income. Transit dues on merchandises carried on land roads or waterways are known as *Vanikapatha*. Taxes on capital (*mula*), share capital (*bhāga*), testing charges for old and wornout coins, and if there is loss in weight their compensation charges; these are the sources of state income. According in Aristotle's Athenian Constitution (2, 1) sixth part of the produce, tenants used to pay to the state.

The superintendent of mint shall manufacture silver coins (*vapya-rupa*) adulterating silver with $\frac{1}{4}$ parts of copper, and $\frac{1}{8}$ th part of Tikhna, tin, lead or Anjana. There shall be a *Pana* (= *Karsāpana* = 1 rupee), half a *Pana*, a quarter and $\frac{1}{8}$ th. Copper coins shall be made with an alloy of 4 parts, into a *Masaka*, half *Masa*, *Kakani* $\frac{1}{2}$ of *Masaka* and half a *Kakani*. The superintendent of ocean mines shall collect conchshells, pearls, corals, salt, and regulate their commerce. The superintendent of salt, after the crystallization of salt is over shall realize the money rent (for the sea sites let out) and the quantity of the shares due to the Government. He shall sell this salt for cash and realize also on it a sale tax of 5 p. c. Imported salt shall pay one-sixth as import duty. This salt shall be sold in cash with 5 p. c. sale tax. The rest of the salt may be sold, not cheaper than the state salt, otherwise to be fined 600 panas. Purchasers shall pay 5 p. c. sale tax. Adulteration shall be punished with the highest fine; likewise persons other than *Vanaprasthas* manufacturing salt without license (3, 12). Merchandise not stamped with seal mark (*mudra*) is liable to be taxed twice. For counterfeiting the seal, eight times the toll. The merchandise being placed near

the flag of the toll house, the merchants shall declare its quality and price (2, 21). On linen (*kakama*), cotton, and silk (*krimitana*) garments, metals, dyes (*varnadhatu*), mail armour (*kankota*), dress (*varana*), liquor, $\frac{1}{16}$ th shall be realized as sale tax. On clothes (*vastra*), quadrupeds, bipeds (*salava*), cotton threads, scents, pottery, oils, liquor, cooked food, $\frac{1}{16}$ th; of flowers, fruits, vegetables, tubers, yam, seeds dried fish and meat $\frac{1}{8}$ as the sale tax (2, 22). By employing experts in manufacturing liquors, the superintendent shall carry on liquor business not only in fortified areas, but throughout the country and also in army camps. Least artisans spoil their work, nobles violate their decency and virtuous character, and fire-brands commit indiscreet acts, liquor shall be sold to persons of well known character in small quantities. Only those who are well-known for character may take liquor out of shop. Bad liquor may be given to slaves or may form the drink of draught animals or for subsistence of hogs. Liquor shops shall contain many rooms provided with beds and seats kept apart. The drinking saloon shall contain scents, garlands of flowers, water and other comfortable things, suitable to the varying seasons. Medaka is manufactured with one drona of water, half an araka of rice and three praesthas of yeast cake (*kinva*). One hundred palas of *Feronia elephantum* (*Kapithba*), 100 palas of fermented sugar and one praestha of honey form Asava. A sourish fermentation of the bark of *Gymnema sylvestre* (*Meskarings*) mixed with jaggery, and with the powder of long or black pepper with myrobalans forms Mairaya. Grape juice is called madhu. One drona of either boiled or unboiled *Phaseolus Mungo* (*Masha*), three parts of rice, and one Karsa of fruits of *Helicteres isora* (*Morata*). In the manufacture of Medaka and Prasanna, five Karsa of *Terminalia chebula* (*Patha*), *Symplocos racemosa* (*Lodhra*) *Piper chaba* (*tejavati*), and cardamoms (*Elavuluka*), honey, grape juice (*Madhuvasa*), millets (*Priyangu*), *Coccoloba fenestratum* (*Daruharidra*), black pepper and long pepper are added as requisite spices. The spirit of *Bassia latifolia* (*Madhuka*) flowers when mixed with granulated sugar makes a pleasing colour. Spices may be added to any distilled spirit (*avetasurā*). Mango beer may contain a larger amount of mango juice. On the occasions of festivals, festive gatherings (*Samāja*) and pilgrimage, the right of private manu-

facture of beer for 4 days may be granted on the payment of license fees (2, 25). Cattle such as calf, bull or milch cows shall not be slaughtered. He who slaughters or tortures them to death shall be fined 80 *Panas*. The flesh of animals which have been killed outside abattoirs (*pari sanam*); headless, legless and boneless flesh; rotten flesh; the flesh of animals that have suddenly died; shall not be sold; if sold a fine of 12 *panas* shall be imposed (2, 26).

The pretty state female slaves or their trained daughters had to work as courtesans, perfumers, apices or as nurses. Their names, addresses, professions were registered and they had to pay to the state about $\frac{1}{3}$ of their income. "A courtesan shall pay 24000 *panas* as a ransom to regain her liberty; and her son 1200 *panas*. When she has lost her charms, she may be appointed as a nurse (*mātrikā*). The courtesans and female slaves who are no more capable to render sexual service (*cepnaga-bhoga*) shall work in public store houses or restaurants. When a man has connection with a minor courtesan maiden against her will, he will be punished with the highest fine; if with a willing but a minor courtesan girl, the same punishment. When a courtesan having received her requisite fee refuses to yield her body, she shall be fined twice the amount of her fee; if it be on the bed itself, she shall be fined eight times, unless he is suffering from any (venereal contagious) disease or is impotent. Every courtesan must give information as to her daily fees (*bhoga*), her prospective annual income and her lover's name. This rule applies to actors, dancers, singers, musicians, music players, rope dancers, jugglers, bards, pimps and clandestine prostitutes. If any of these come from another state they shall pay five *panas* license fee (*prakṣāvetana*). Everyone earning his living by the exhibition of his body (*rupajiva*) shall pay to the government twice daily income every month, (2, 27).

The superintendent of weaving to manufacture threads, coats, clothes and ropes shall employ qualified persons. Widows, crippled women, maidens, nuns (*Prahrajitā*), women compelled to work in default of the payment of fines (*danda-pratikarini*), female perfumers nurses, state female slaves, temple maids that do not work, shall be employed for carding wool, plant fibers, cotton, capok (*kulā*), hemp (*sana*) and linen (*keśauma*). Those

who weave linen (kehauma), flaxen (dukula), silken (kumiten - filaments from silk worms), woolen (Rānkava, from Banku deer wool) and cotton (kārpāsa) threads shall be rewarded by presentations such as scents, garlands of flowers or any other gifts of encouragement. These women who do not stir out of their homes, and those girls who for want of dress can not go out, but compelled to work for subsistence, shall be provided with work through the maid servant of the weaving establishment politely. Those women who can present themselves in the loom hall (sutra-sālā) shall be enabled at the dawn of the day to exchange their weavings for wages. If the superintendent wastes his time gazing at the pretty faces of women or talks about any other work shall be punished with the highest fine. Delay in paying wages or for paying for unfinished products shall be punished with medium fine (2, 23). The superintendent of agriculture (Sitadyaksha), well versed in cultivating plants or trees or by others who know them, shall collect in time seeds of all kinds of grains, flowers, fruits, vegetables, bulbs, roots, linen and cotton seeds. In well-plowed state lands, he shall employ slaves, workers and prisoners (danda-pratikarti) to sow the seeds. Their work should not suffer for inadequate supplies of ploughs, any other instrument or bullocks. Nor shall there be any delay in procuring for them the assistance of blacksmiths, carpenters, drillers of holes through wood, rope makers, snake catchers or any other person. Any loss sustained for inadequate or untimely supply shall be punished with fine, compensating the loss (2, 24). The king shall provide the orphans, the aged, sick, afflicted and the infirm with maintenance; and (helpless) pregnant women and the children they give birth to. Village elders shall manage the property of minors until they attain their majority; likewise any religious endowments. If not fallen (patita: condemned to imprisonment for a criminal offence), when a capable person neglects to maintain his children, wife, mother, father, minor brothers, sisters or widowed daughters, he shall be punished with the fine of 12 panas; likewise women. When without making provision for the maintenance of wife and children any person becomes a wanderer, he shall be punished with the highest fine; likewise any person who makes a woman an ascetic. A man who has passed the age of copulating capacity

may become an ascetic after distributing the properties of his own acquisition (among his children); or he will be punished (2, 1). The selling or mortgaging by kinsmen of a Sudra (Chudra) who is not a born slave, but is an Arya (noble) by birth, and has not yet attained majority; shall be punished with a fine of 12 panas, of a Vaisya, twice; of a Kshatriya thrice; of a Brahman, 4 times. If done by others (than kinsmen), the punishment shall be of three kinds of first, second and third degrees, purchasers and abettors likewise. It is no crime for the Mlecchaa (Molossia) to sell or mortgage their people. But an Arya (a high class person in India) shall never be subjected to slavery. However in order to tide over family troubles, to secure money for fines or court dues, or to recover family possessions, if an Arya is mortgaged, he should be redeemed as soon as possible, if he is a youth capable of rendering help. Any person who has voluntarily enslaved himself, if found guilty of an offence, shall be a slave for life. Similarly a person, who has been twice mortgaged, if found guilty, shall be a slave for life. If any of these persons tries to escape, shall be a slave for life. Deceiving a slave of his money or depriving him of the privileges to appear as a noble man shall be punished with half the fine. Mortgage sum paid in security of a convict, a dead body, or a sickman, shall be paid back. Employing a slave to carry a dead body or to cleanse excreta, urina or food remnants; keeping the slave naked; hurting or abusing him; or violating a female slave; shall cause the forfeiture of the price paid for the slave (manumitted). The violation (rape) of nurses, or maid servants will give them liberty. Violence towards a slave of high birth shall entitle him to run away (as a freedman). When a master has connection with a nurse or a pledged female slave against her will, he shall be punished with the highest fine; a stranger a medium fine. When a man commits or helps to commit rape on a virgin slave or pledged to him, he shall not only forfeit the purchase value, but shall have to pay her marriage dowry and twice the fine to the government. The offspring of a man who has sold himself as a slave shall be a free man (Arya). A slave shall be entitled to enjoy not only whatever he has earned without prejudice to his master's work, but also the inheritance from

his father. On paying the value, a slave shall regain his freedom (*Āryatvam*). The same rule applies either to born or pledged slaves. The ransom necessary for a slave to regain his freedom is equal to what he has been sold for. Any person who has been enslaved for fine or court decrees shall earn the amount by work. An *Ārya* made captive in war shall for his freedom pay a certain amount, proportionate to the dangerous work done at the time of his capture or half the amount. If a slave, less than 8 years old, either a born slave, and has fallen to his master's share of inheritance, or has been purchased or obtained by his master in any way, is employed in mean works against his will or is sold or mortgaged in a foreign land; or if a pregnant female slave is sold or pledged without any provision for her confinement, his or her master shall be punished with the highest fine; the purchaser and abettors likewise. Failure to set a slave at liberty on the receipt of a required amount of ransom shall be punished with a fine of 12 *panas*; putting a slave under confinement for no reason shall be likewise punished. The property of a slave shall pass into the hands of his kinsmen; in the absence of any kinsman, his master shall take it. When a child is begotten on a female slave by her master, both the child and its mother shall be at once recognised as free. If for subsistence the mother remains in her bondage, her brother and sister shall be liberated (3, 13).

The workmen of guilds (*sanghabhrittah*) shall have 7 nights over and above the period to fulfil their contract. *Sanghabhrittah* or co-operative associations (*ambhuya samutharah*) shall divide their earnings either equally or as agreed upon. A healthy person who deserts his company after work has begun shall be fined 12 *panas*. Anyone who is found to have stealthily neglected his work shall be given protection for the first time and shall be given proportionate share of work with the promise of proportional profit. In case of negligence for the second time or running away, he will cease to be a member of the company. If guilty of a serious offence, he may be accused (3, 14). When a family head misappropriates the joint family income, when one violates a widow of independent living, when a *Candala* (indecently) touches an *Ārya* woman, when a person

does not render helps to another in danger, when one invites in a dinner in honour of gods or ancestors Sākya (Buddhists), Ajivakas, Vriśhalas (Ephthalits or Vetala Barsileas; Saka-Basileas) and exiled persons (parivrajita), a fine of 100 panas shall be imposed. When between father and son, husband and wife, brother and sister, maternal uncle and nephew, or teacher and student, if one abandons the other if neither of them has been criminally convicted (*patita*), highest fine shall be imposed (3,20). If physicians without informing (the government) undertake any dangerous case, and the patient dies, he shall be punished with the highest fine. If the patient dies due to carelessness of the physician, medium fine. If due to the carelessness or negligence of the physician, the case turns out to be serious, the offence will be regarded as an assault or violence (4, 1).

When a superintendent of jail puts anyone in the lockup without announcing his offence, he will be fined 24 panas; if he is put to work, twice the amount; when he is transferred to another place, or is deprived of his food and drinks, 96 panas fine; if he is beaten to death, 1000 panas fine. When he commits rape on a female slave or a pledged woman in the lockup, he shall be punished with the highest fine; if with the wife of a thief or burglar, medium fine; if with a free woman (*ārya*) in the lock up, highest fine. When an offender commits rape upon a free woman (*āryā*) in the lock up, he shall be killed. If the superintendent rapes a free woman (*āryā*) for untimely movement at night, he shall be killed just as well (4,9). If a man defiles a willing virgin, he will be fined 54 panas; if the maiden had connection with a man of her same rank, she will be fined 12 panas; while any other who had abetted it will be fined twice as much. If the maiden had been enticed against her will, the abettor shall not only be fined 100 panas, he will also provide the maiden with her nuptial dowry. A woman who solicits men shall be condemned to be a state slave (to practise prostitution; 4,12). Sexual intercourse with a willing nun shall be punished with the fine of 24 panas, and the nun herself shall pay the same fine. If one has violated a perfume or flower maiden, he shall be fined 12 panas. If a man has non-vaginal (*a-yonau*), that is, anal intercourse

with a woman, he will be punished with the highest fine. If a man has homosexual union (pederasty), he will be punished with the highest fine. If one has sexual intercourse with beasts, he shall be fined 12 panas; if one practises masturbation with idols (daivata pratims), the person will be punished with twice the fine (4, 13).

A wife who hates her husband, and has passed the seven periods of her menses, shall return to her husband the endowments and the jewellery she has received from him, and will allow him to sleep with another woman. A man hating his wife shall allow her to take shelter in a nunnery, with her guardians or with her kinsmen. If a man falsely accuses his wife of having committed adultery with one of her class, or with a spy, to be proved only by eye witnesses, he will be fined 19 panas. A wife hating her husband cannot get her release (moksha = divorce) from her husband against his will. Nor can the husband get release from his wife against her will. But on mutual hatred they can secure the liberation (divorce). If a man apprehending danger from his wife desires divorce, he shall return to her what she brought. If a woman apprehending danger desires divorce she shall forfeit her claim to her property (3,3). If the husband is of bad character, is long gone abroad, has turned a traitor, is likely to endanger her life, is criminally convicted or is impotent, she may leave him (3,2). **Mauryas** were overthrown in 184 B.C. by **Sungas**, **Sungas** were the **Tungus** (M.Bh. 2,52,3 **Tungan**) people. North-western China was ruled by them from prehistoric times. The **Tungus** were known as **Tang**, **Shang**, **Sung**, **Sun** and **Sen**. The **Tungus** were the dominant dynasts of China until the **Sungas** divided the Chinese empire with **Kins** (Kanva, another branch of the **Tungus** peoples) and both were overthrown by the **Mongols**. The **Sungas** in India like the **Sungas** of China abolished the centralized government, adopted feudal system. **Sungas** identified themselves with the **Brahmins** and surrounded **Sungas** and **Brahmins** generally with semi-divine sanctity. Like the **Sungas** of China they created peasant proprietors of the land. Land no more belonged to the state but to the farmers. **Sunga** coins and inscriptions mention the feudal states of **Bharat**, **Kausambi** and **Panchala**.

Sungas (Pulindas) were matrilineal in their succession from mother's brother to sister's sons through cross-cousin marriage. In the Bharhut inscription of the Sunga period one finds Vatsi-putra Dhanabhuti, son of Guptiputra Angaradyuta, grandson of Rajan Gargiputra. In the Mathura inscription there is Sivenimitra, son of Kausiki (wife) of Guptiputra. In the Pabhosa inscription of Asadasena, son of Gopali of Vaidadari, mother's brother of Rajan Bahistatimitra, son of Gopali. *Manu Samhita* in which Senapati (Pushyamitra's) name (12, 100) is found is the legal code of the Sungas. *Manu* (7, 2-12) emphasizes the majesty of the king as Sungas of China have done, but the king should be benevolent and fatherly. *Manu* like the Sungas regulates the economic life of the people by fixing the commodity prices in terms of coins and standardizing weights and measures. Artisans come under state supervision; physicians are fined for their negligence of duties (7, 14-21; 82-88; 8, 40-403; 9, 216-280). But the king shall act on joint advice of his 8 ministers, including the ambassador who was responsible for the relation with foreign states (7, 54-68; 147-51). Every village shall have a committee with an elected head who will be responsible for the conduct of all villagers; a group of villages shall be combined with the collective responsibility (7, 118-122). The produce rent of crops varied from $\frac{1}{2}$ to $\frac{1}{4}$ according to the fertility of the soil and according to the provinces. The state was entitled to also $\frac{1}{10}$ of cattle and $\frac{1}{4}$ of trees, flowers, fruits, bulbs, spices, perfumes, meat and honey; $\frac{1}{10}$ of the value of the sale proceeds of merchandises was levied by the state. Artisan had to pay one day's labour in a month to the state. Drinking and prostitution were made unfashionable, if not abolished by *Manu*, that is in Sunga and Kanva periods. Corrupt officials, astrologers, cheats and prostitutes (female traders of their body—*pahiya yoshita*) are the thorns of the state (*Manu* 9, 259). Death penalty shall be inflicted for raping an unwilling maiden, but not when she has given her consent (*Manu* 8, 364). Adulterers and adulteresses shall have their noses and ears cut off and exiled from the state (*Manu* 8, 352). Sesanagas were matrilineal in their descent. They practised cross cousin marriage like the Sungas and Kanvas. Sister's son inherited the property. Sister's husband was appointed as the commander-in-chief, known as *brother*. One's own sons

were appointed as viceroys over provinces. (Gotami putra) Biska (Śātakarni's) name is found in Nanāghat inscription. In Nanāghat and Nasik inscriptions his brother-in-law Vasisthiputra Kanha (Kriṣṇa) of Sata or Śāli-vāhana clan is found. Queen dougrees Gautami Bālasri's Pandu Lena cave inscription of Nasik, made at the 18th year of the reign of her grandson Vasisthi (Vasisthī)-putra illustrious Palurāya, mother of illustrious Gotami-putra Śātakarni who had humbled Khakharāta (Saka Kirāta), Sakas and Pahlavas. Gautamiputra Śātakarni in his Pandu Lena cave inscription of Nasik from the camp of victory of the vajrayanti army at Govardhana grants the village of Aparakakhai to Takirasi ascetics, owned previously by Ushavadata (son-in-law of Nahapāna) Khakharāta, Vasisthi Jivasati, the queen Dowager, the great queen of Gautamiputra Śātakarni also grants Kakhadi village of Govardhana to the Trisami ascetics. Her grandson is Sivasri Apilaka. Kharvela of Kalinga in his Hāthigūphā inscription mentions that in 18th year of his reign, in the 164th year after the reign of Mauryas (Chandra Gupta 321 B. C. Mauryas ruled according to Purans for 137 years $137+164=301$) defeated Śātakarni who ruled about 21 B. C. And Biska became dominant by defeating the Yuechi (Yaksha) Ephthalite (Vetala) Vikramaditya 57-21 B.C. of Ujjain. We have next Vasisthiputra Kuntala Svati Karna, mentioned in Kāmasutra (3, 7, 28), with the next king Gautamiputra Hala of Sapta Śātaśa fame, who perhaps introduced Sanskrit in place of Paishci, the language of the Śaśanagas. With Hala Śāli-vāhana rule ends. And Andhra bhrityas Vilivakura (Baleo kouros of Ptolemy) became dominant. With Gautamiputra Yajna Śātakarni, Śāli-vāhanas again became dominant. He was succeeded by his nephew Vasisthiputra Śrī Candra Sati (418 A.D.), Kanva (Kun=Kin) Seeraman of Magadha became emperor in 21 B. C. Vikramaditya was a Vetala (Ephthalite; Abdesos), a Tocharian Yuechi people, speaking cantum variety of Aryan tongue, Vikramaditya usurped the viceroyalty of his brother Bhartihari in conspiracy with his brother's wife. Vikramaditya with the assistance of Vetalas and Yakshas declared independence of the Kanvas. Andhras (Ait. Br. 7, 18=Yuana) consisted of 5 clans: (1) Śātavāhanas (Śāli-vāhana); (2) Cutas; (3) Mudus; (4) Vilivayas; and Abhiras.

(Avars). Śalivahana of Sisuka—(Sees of Sogdiana) Nāga (Sieu-nāgas of Magadha ; Susinak of Susiana ; Sesanāga—Hsiang-nu) conquering Vetala Vikramāditya of Ujjaini and suzerainty of Kanva Bhumimitra became dominant in 21 B. C. Andhra coins show that the Andhras had feudal system, and sister's son inherited the property and kingdom. And even Andhra rulers used mother's name in their royal titles as Yajnasri who associated his queen mother in the administration. An inscription of Sri Pulumavi of 2nd centry A. D. shows that military officers held large fiefs of lands. Naeik and Jungar inscriptions show that the trade guilds were highly organized, especially of weavers, braziers, grain dealers, and they acted as banks, receiving deposits from the public at stipulated rates of interest. Even the state entrusted them with permanent endowment funds, for supplying medicines to the public and taking care of the sick. Endowments were registered in the Town Hall. Yājñyavalka's Smṛiti seems to have been the legal code of the Andhras. But among the matrilineal Sungas, Kanvas or Andhras, there was a peculiar custom. An inscription in the Lucknow Museum: Khajabute putanam(in)go pathithapita Vasethaputena Nagasirina piyata(m) vata=The lingas of the sons of Khajabute were dedicated to Nāgāri. May the deity be pleased. We know at the annual festival of the Phrygian goddess Agdestis who was born a hermaphrodite out of the semen of sleeping Zeus falling upon Mother Earth (Gods deprived Agdestis of his male organ. Agdestis fell in love with Attis who however preferred Cybele, The Great Mother), Agdestis out of jealousy struck Attis with madness. And Attis tears out his penis in a frenzy. The priests of Cybele in Phrygia used to castrate themselves to serve the Goddess. There were ten Sibylla (Sivāni) prophetesses (dasa Mahāvidyā) whose Sybilline oracles were kept in the temple of Juppiter Capitolinus. The Cybele (Gk. Kybele), the Mountain Mother (Hindu Pārvati, Gīrijā), for her temples were usually situated on mountain tops) was called the Great Mother of the gods (Mater deum magna=Jaganmātā) The cult of this popular Phrygian goddess was introduced to Rome with a meteorite stone in 204 B. C. in obedience to Sybelline prophecy. The cult was also prevalent in Greece from 8th century B. C. Her priests Galli were eunuchs, attired in female garb

with long hair, fragrant with ointment, who in orgiastic excitement with priestesses (*Bhairavis*) often emasculated themselves. It is very likely that the Bryges (*Bhrigus*) brought the cult to India, and *Cybele* has been named *Kālī*. *Kālī* was fond of reverse sexual union, that is, she preferred the copulatory posture in which she was on the top (*vīcarita ratāturam*, Tantra Sāra—a Phrygian fashion) of her consort *Mahākālā* (birth, adolescence, marriage, death and rebirth or resurrection of *Attis*—*Atta-bārah* or *Saka Zius*—supreme lord Siva—time spirit). *Cybele's* attendants *Corybantes*—are *Kālī's* *Dākinīs* (Tib. *d* *Jag*—wise women). In Gujrat *Hijras* are the emasculated votaries of goddess *Bouchers* (appears to be a Greek name), and they come rejoicing at the houses where a male child is born (as if *Attis*) and demand presents.

Sakas (Chinese *Sok*; Gk. *Sakas* = *Scyths*) pastoral tribes, living in Kashgar area, pressed by Yuechi (*Asi*—*Asvaka*), in alliance with Parthians settled about 160 B.C. in Seistan (*Sakastan* in W. Afghanistan) and in the Kabul valley (*Kapisi*); and from *Kapisi* to *Taxila*, W. Punjab, *Mathura*, *Malava*, *Mahārāstra* and *Gujrat*. From *Seistan* *Sakas* occupied *Sind*. *Pātanjali* places *Abhiras* (*Avars*), the advance-guards of the *Sakas*, in *Sindhudesa* in 2nd century B. C. *Abhiras* acted as the trusted army officers of *Sakas*. *Mahārāstra* *Sakas* with capital at *Nasik* belonged to *Kashahrata* (*Karatai*—*Kiratei*—*Kirata*—*Kitans*). *Saka* onslaughts gradually absorbed the *Andhra* empire. The *Sakas* assumed the title of *Kashatraps*, an abbreviated Persian from of *Kashathrapavan*. The *Sakas* adopted also the feudal system. *Rudradaman* boasts that he deposed and reinstated many *Rajās* and assumed as a suzerain the title of *Mahākashatraps*. *Sakas* had two kinds of Ministers—*mati-sacivas* (councillors) and *karma-sacivas* (executive officers). High officers were called *Amātyas*, particularly the governors, but in *Nasik* cave inscription *Amātya* is called *amaca*. The ministers had full control over the government finance. When the dam of *Sudarsana* lake burst, the ministers objected to its repairs on account of its cost, as they said that the breach was too extensive and the repair cost would be enormous. But the people suffered. And *Rudradaman* out of his own private fund reconstructed the dam thrice as strong both in length and breadth without any additional taxation or forced

labour. A village given for charitable endowment was free from all taxation, and tax-gatherers and police men were not allowed there. Salt was a state monopoly. Usavadata, son-in-law of Nahapana, built four quadrangular rest-houses, constructed wells, tanks and gardens, established free ferries at many places and many halls for religious and political gatherings; he dedicated the village of Karajika to the support of all ascetics "without any distinction of sect or origin" so that they can spend their monsoon at the caves of Valurak, and he invested 2000 in one weavers' guild and 1000 in another weavers' guild for their maintenance. He gave the income of 3000 coconut trees of a village to the corporation of Carakas. The coins of the Śaka, Parthian and Kushan kings had both in Greek and Devanagiri characters Greek and Hindu titles and symbols. Azes is styled Mahārāja Rajamohata as well as Basileus Basileon Megalon.

The Kushans (Chinese Kuo-shin = Kuoshin, Chou-Shin, Tibetan Kaisin) overthrowing Parthian dynasty, occupied central Trans-Oxania, parts of Iran, Afghanistan and Northern India. Kushans belonged to the Yue-Chi (*Yaksha* = *Asvaka* = Chinese *Chou* dynasty) tribe. They were Tocharian (Purāṇic Takshaka Nāgas = Tajiks = Rv. Tuji) Aryans speaking the centum variety of the Aryan speech. Yuechi = Asvakas of Afghanistan who fought valiantly against the Alexander's army. In Turfan mural paintings, Yuechis are vividly depicted as fair complexioned leptorrhine tall dolichocephals with blue eyes and golden hair. Asvalāyana Grihya Sūtra was also the religious manual of the Asvakas. Epithetes or Abdaloī, Chinese Yetha, the Vēṭālas who ruled Ujjaini and whose chief Vikramāditya established the Vikrama era in 57 B. C. by overthrowing the last Kanva ruler Bhumimitra. Not only the Yuechi Chou dynasty ruled China between the Chins, the Later Chins were also offshoots of the Chous. And many of the customs introduced by the Aryan Chous still persist in China. Menstruating woman cannot touch anything on the hearth, where there is a representation of the fire god by the name of Zonsen. Eldest son got a larger share of father's property, and girls did not inherit any property but marriage dowery. The Kushans especially Kanishka, like the Chou Kings assumed the title of the son of heaven—Chinese Ten Tzu—Devaputra Kushan. King Kadpheses I ruled up to the

Indus. His son Kadphises II conquered the Punjab and possibly some parts of the northern Gangetic plains. The newly conquered territories were ruled by military viceroys who were allowed to issue coins in their own names. Kadphises II maintained diplomatic relations with China; and it is likely that he sent an embassy to congratulate Trojan in 99 A. D. He was succeeded by Maharāja devaputra Kanishka. Kanishka made Purushapura his Capital from which he ruled his vast empire, extending up to Central Asia. He adorned Purushapura with many magnificent Buddhist monasteries, and a great relic tower with a wooden superstructure, 13 stories high (about 400 feet), surmounted by a mighty iron pinnacle. He was eclectic in his religious views. And under his patronage Mahāyāna doctrine, synthesis of Buddhism, Hinduism, Zoroastrianism and Gnosticism, the broad religion of humanity, was elaborated. Kanishka held a great Buddhist Council in Kundalavana in Kashmir. He appointed new officers, superintendents of Justice (Dandayoga-Danda Nāyaka), of new buildings (Navakarmiga) and of repairing of monasteries (Vihāra-Karavhaena). His Navakarmiga was a Greek Agisala. On the Kanishka casket in which Kanishka is crowned with a wreath, there is an inscription—Dasa Agisāla Navakarmi Kanashkasa Vihara Mahāsensasa Sangharame=The slave Agisāla, the superintendent of works at Kanishka's Vihar of Mahasena. The name Agesilas and Ageisilas have been in a Boettian inscription from N. Greece. According to tradition Kanishka carried Asvaghosa, author of *Sutralankāra* and *Buddhacarita*, from Pāṭaliputra to his capital. Any way they were contemporaries. Asvaghosa advocated monarchy to rule the people with benevolence, justice and wisdom, for the welfare of the people, and to set examples as an ideal, and not for personal gratifications. Kushans were succeeded by Little Kushans—Kidāra—Kitala=Kitane=Kirātas, leptorrhine tall dolichocephals. When Kushans occupied Persia, Afghanistan and N. India, Kidāras occupied Bactria which had come under Sassanid (Kushan) domination about 230 A. D. But Kitāras being threatened by Jonan-Jonan (Wusun), tall fair complexioned dolichocephals with green eyes—Vāsuki Nāg—Mitanni Wassuggadni—Usuvis—Uzbeg—acknowledged the suzerainty of Sassanian empire and assisted Shāhāpur in his invasion of Mesopotamia.

But Kidāras asserted their independence in 387. Kidāras pressed by Woannas at Balkh occupied Gandhara and made Kabul their capital between 376-380. But the Huna conquests over Sassanians, and the Arsacids by the Tochari (Tukhara), and the Huna and Gupta pressures endangered the positions of Kitāloos. The Kitālo rulers were Piro, viceroy of Pushkalāvati, Varo Shahi, Piroch, Buddabala, Bhāsa, Tarika who issued coins in their own names. Their kingdom flourished about 430, but collapsed before the Huna about 450. In Mathurā, Kushan sculptures of fine Aryan type and execution have been found in great abundance. The Yakshis, the Yuechi Venuses, are marvellous creations.

Kidāras were succeeded by Marundās (Mandas-Madras-Cimmeri-Kinnara, leptorrhine tall dolichocephals), noted for their personal beauty, love of songs and dances, romantic love and conjugal fidelity. According to a Chinese embassy in Siam in third century which mentions that a Marundarāja was a powerful and paramount sovereign. According to Allahabad inscription of Samudra Gupta, he subjugated Daivoputras (sons of heaven, the title of Kushans), Sahi and Sahasusahi (the titles of Kidāras, and Marundās). Marundās were succeeded in northern and central India by Vakataks (a branch of the Sasa Nāgas-Hsiangnū) and who styled themselves as Brahmins. Nagar Brahmins of Gujarat possibly belonged to them.

The Guptas ousting the Andhras in Patāliputra area became powerful. According to Kaliyuga Raja Vṛttānta, embodied in Bhavisyottara Purāṇa, "Sri Candra Gupta will be born in the dynasty of the Pārvatīyas as grandson of king Brīgupta, the ruler of *Sripurvata*. He (Candra Gupta) will be the son of Ghatakaca Gupta and will be of unsurpassed valor. He will marry Kumāradevi, the daughter of Nepāl ruler (Licchavis). He will carry influence in this kingdom (Magadha) with the help of the Licchavis and will be the commander-in-chief (of Andhra ruler Candra Sri-Vasisthiputra Sri Candrasesti) with a large army. He will next marry another girl of Licchavi descent, the younger sister of the queen of Candra Sri, and thus become the brother-in-law of the king. Instigated by the queen, after killing Candra Sri by some foul means, he (Candra Gupta) will be appointed by the queen to act as the regent of her son.

Within seven years (313-320), the leader of the fighters will obtain the kingdom by killing Puloman, the son of the king. He (Candra Gupta) will forcibly capture the kingdom of Magadha from the Andhras and will rule conjointly with his son Kasa, born of the Licchavi wife, (sister of Candra Sen's queen). He will reign for 7 years (320-327) with the title of Vijayāditya. He will establish an era in his own name. His another son, (Samudra Gupta), the grandson of Nepala ruler (also Licchavi) will be a paramount power, supported by Mleccha soldiers. He (Samudra Gupta) will be known as Asokāditya, after killing his deceitful father, his sons (by the other Licchavi wife) and other supporters. Thus greeting his mother and without repentance Samudra Gupta will become a paramount sovereign. After his wide conquests, with the performance of Asvamedha rites by the priests, he assumes the title of the Son of Justice (Dharma-putra). He will be honoured by the kings of his own country and of foreign lands; will be fond of laws, literature and music, and will be praised by the poets. Samudra Gupta will rule his kingdom, surrounded by four seas, without any rival for 51 years (327-378). His son Candra Gupta (II), a great fighter, will drive out of the country Yavanas and Hunas by force of arms. Like the powerful son (Vikramāditya, surrounded by planets) he will be constantly surrounded by learned men, well versed in the Vedas (Śruti), law books (Smṛiti), Purāṇas, history and poetry. He will be famous as Vikramāditya by crossing the Indus (Sapta-Sindus) and her tributaries (the Punjab rivers), and conquering the Bahlikas. Having raised pillars of fame (kīrtīśambhas) even in Surāstra he will enjoy his kingdom for 86 years (378-464). His son will be Kumāra Gupta, born of Dhruvadevi. Dhruva Devi was the wife of Rāma Gupta, elder brother of Candra Gupta. In an expedition against the Sakas of Giripura (Girnar), Dhruvadevi was captured by the Saka ruler. Candra Gupta entered into the camp of the Saka ruler in the guise of his mistress, killed the Saka and rescued Dhruvadevi. Then Candra Gupta usurped the throne and married Dhruvadevi. It has been dramatized in *Pushkadatta's* Devi-Candra Gupta who will conquer his enemies as Kumāra (Kartīkeya commander of the gods) vanquished his foes. His son Skanda Gupta will be like Skanda (Kartīkeya). He will destroy the Puryasenās (Yuechi

soldiers) and humble the pride of Hunas. In Kaumudi-Mahotsava, written by Vijñā (Vijayā), it is mentioned that Candra Sena was a Karaskara (Kakar Jats = Karkata Naga. Karkata = Kirghiz, an Alpine tribe. To the Karkata Nagas belonged the Mallas, after whom Malava has been named; Karkata Nagar of Jaypur of 2nd B. C. Mallas of Kusī Nagara of Buddha's time; Yasodharman Vishnuvardhana of Karkata Naga descent of Thansewar; Vardhana of Pusyavati dynasty of Thansewar; Karkata dynasty of Kashmir of whom Lalitaditya was a great emperor; Karkata Nagas of Mahismati; possibly thence they migrated to Malabar, as well as Nagercoil and Nagapattan, named after them); with the aid of the Licchavis, Candra Sena secured the throne. They also put into prison many nobles of Magadha. Sundaravarman of the Maṅkharas (Madra = Cimmeris = Kinnara) fought for supremacy, but was killed. His son Kalyāṇavarman with his father's minister Mantragupta took refuge in Pampā in the Vindyas in the domain of the Vakataka Nagas. Kalyāṇavarman's nurse became a nun under the name of Yogasiddhi. She became intimate with the Surasena chief Krittisena, which was then under Nagasena of Mathurā. Krittisena's daughter Kirttimati accompanied Yogasiddhi on pilgrimage to Vindhyaśālini, built by Bharasiva ruler Vindyaśakti (248-234 A. D.). While halting at Pampā Kirttimati and Kalyāṇavarman met and fell into love with each other; Yogasiddhi recognized the later as the one she had nursed. Soon after Mantragupta succeeded to recover parts of Maṅkhari kingdom, and Kalyāṇavarman was crowned. And Krittisena proposed the marriage of his daughter Kirttimati to Kalyāṇa which was too gladly accepted.

Whether the later Guptas were offshoots of Maurya (Lat. Maurus; Gk. Moyras = Moris) Guptas (Copts: Ancient Egyptians called the Copts Gabt and Gopta, Gk. ai-Guptas) or Karaskara (Karkata = Kirghiz), it is quite certain that these Guptas not only promoted unity of India by their well-organised government by internal peace and security, justice and toleration, but contributed also a distinct literary and artistic impetus and initiative. We owe to Asoka well polished monoliths with spirited animal capitals; they made the sudden appearance in India, and yet unsurpassed. Asoka perhaps is the most enlightened

ruler and emperor the history has ever recorded. Asokan administration is still the golden period of India's history. Guptas were also patrons of learning and arts. Candragupta Vikramāditya's Navaratnas (nine jewels), headed by Kalidāsa in his Ujjaini court is still a household word in India. It is very likely that Mahābhārata, the great encyclopædia of ethics, morals, politics and ancient historical traditions, was recast and re-compiled under the Gupta patronage. Gupta sculpture and architecture are noted for their refinement and excellence. The contributions of Nāgas were no less insignificant. Their portrait sculpture was very fine. As the Nāgas were city dwellers for administrative purposes, Nagara has become synonymous with town. Nagara style of architecture consists of a four-sided pinnacle (sikharā) on a square body. It is very likely Nagri script evolved from the Mohenjodaro, Kharostri and Asoka Brahmi scripts. For their foppish style of living and loose sexual morals Nāgara means a beau. Possibly Nagpur was their chief town. Nāgarika, the polished dweller of city, means a distinguished citizen, if not the mayor. Bhava Nāgas of the Bharāṇi were besprinkled on the forehead with the pure water of Bhagirathi that had been obtained by their valour which is still commemorated by the Dasasvamedha Ghāt of Bārānasi where they performed ten Asvamedhas (horse sacrifices) for their great victories. Mahesvara Nāga, son of Nāgabhatta, is found in Lahari copper seal inscriptions. Candragupta, the second Nāghavant, is likely the Candragupta of the Delhi Iron pillar inscription. Candragupta conquered from the mouths of the seven rivers (Sapta Sindhu) to Bahlīka (Balkh) and thence to Bengal according to the Iron Pillar Inscription. The Iron Pillar near Kutab Minar, 2½ feet above ground with a tapering shaft and ribbed bell capital and 20 inches below the surface, weighing not less than 6 tons, perfectly welded, is a triumph of metallurgic skill of the ancient Hindus. The metal is of exceptional purity, containing 99.72 p. c. iron. That has made it rust proof though it has been exposed to weathering of more than 16 centuries and its inscription of 4 lines in neat characters engraved on its surface has been perfectly preserved. Though it seems that Harsha of Pusyabhūti Karkata (Malla)-Nāga Dynasty, remained a celibate according to Bāna, there were female attendants, showrie bearers

and shampooers. Eunuchs were employed at the court and for guarding the females, Achaemenides indulged in polygamy. Rather it became the fashion with their nobles to change their sleeping partners every night. To keep guard over these harem women eunuchs were employed as guards. This custom of eunuch guards spread from Assyria-Persia to Greece, China and India. Many of the eunuchs exercised great authority and power. There were white washed tall buildings in Kanauj, many pretty gardens and artificial lakes where unusual specimens were collected and kept. In the palace there were number of servants and cooks. Harsa had a golden bath, filled with scented water in its midst, with a crystal bathing seat by it and a number of pitchers, placed on one side, full of most fragrant waters. Lovely maidens duly besprinkled the king. And suddenly trumpets sounded for bathing, followed by songs with flute and poems by court poets. His limbs were anointed in the perfuming room with sandalwood paste, sweetened with the fragrance of saffron, camphor and musk. After his meal was over, a portress, standing close by hastened to him and "leaving on her arm, he went to the hall of audience, followed by ministers and courtiers. Reclining on his couch while a maiden seated on the ground, having placed in her bosom the dagger she was wont to bear, gently rubbed his feet, and the king resting for a while discussed many problems with his ministers and friends who had appointment with him at that time." There were silk tapestries at the ends of the hall. According to Hsuen Tsung (Tungus), Harsa divided his state income into 4 parts. One part was spent in administrative expenses; another part for pays of his officers; the third was spent for rewarding men of distinguished ability; the fourth for charities.

The Huns (Huns—Hsiangnu) with Kazars (Pers. *Qajar*—*Gurjar*—Gujars, all Alpines, slightly mixed with other tribes) and some Ephthalite (Abdelai—Thela—*Vatala*—*Toramara*) people overcoming the Sassanian, Kushan, Kitalo and Gupta resistance, entered into India and spread over northern and western provinces. The Kazars established themselves as Qajar dynasty of Teheran; in India as Gujjars from whom Gujranwala and Gujarat have been named. There is a Hun clan among the Rajputs. The later conquering hordes or a branch of Hsiangnu or Hiangnu was known was Huns; the former ones as Nagas.

The Sanjam plates of western Calukya (Salanki Huna) Budharasa from Thana mention the title of Rajādhirāja Paramesvara. The title of Mahārājādhirāja Paramesvara is frequently met with. The Huna distributed the land among their nobles and chief army officers, who are called Nai Yogokas. The Dutakas—ambassadors—are called Ajnāptis. Departmental heads are called Divirapati. In the Nansari plates of Srijaśva (571) Ahara (Abhir=Ahir) has become a subdivision of Disay (a district officer). Two grants of Dadā IV (641) from Gujarat mention Bhogikapālakas—superintendents of feudatories. Yekkeri and Chiplun inscriptions mention Visayapatis—Superintendents or governors over district officers. Aliva copper plate inscription of Śilāditya (766) mentions Dasagrāmikā (officer-in-charge of ten villages) and Karas as officers charged with the registration of properties of transfer of properties.

Hsien Tsung (Tungus), the Chinese traveller, in the first half of seventh century says: "As the regions vary in their physical characteristics, they also differ in their natural products. There are flowers and herbs, fruits and trees of different kinds. There are for examples of fruits—āmra (mango), Amle (tamarind), Madhuka (Mahuya flower), Badara (plum), Kapitha (wood apple), āmaraka (hog apple), Udumbara (figs), Mucā (bananas), Nārikela (coconut), and Panas (jack-fruit). It is impossible to enumerate all kinds of fruits, and one can only mention in a summary way all those which are held in esteem by the inhabitants (Chinese) jujubes, chestnuts, green and red persimmons are not known in India. In Kashmir, pears, plums, peaches, apricots, grapes are planted here and there. Pomegranates and sweet oranges are grown in all places. There is much rice and wheat, ginger, mustard, melons and pumpkins. Olives are also cultivated. Onion and garlic are not much used. Milk, ghee, granulated sugar, sugar-candy, cakes, parched grains and mustard oil are the common food. From Takka to Mathurā upland rice and spring wheat are raised; at Jalandhara upland rice and other grains. Pariyātra (Bairat) produces good crops of spring wheat and other grains, including a peculiar kind of rice (millet) which in 60 days is ready for cutting. Mathurā is famous for mangoes which are of two kinds, one small and becoming yellow when ripe and the other large and remaining green.

The wines from the vine and sugarcane are the drink of the Kshatriyas; Vaisyas drink a strong distilled spirit; Buddhist monks and Brahmins drink syrup of grapes and sugarcane; low mixed castes drink indiscriminately". Not only soldiers and workers indulged in drinkings, but even women and princesses. Savoury meat dishes and perfumed liquors were the popular fashions of the days. Wines were flavoured with mango and jasmine flowers (Kāli, Raghu 19, 46). It was thought intoxication lent special charms to damsels (Kāli, Māi, 3). Bāna mentions wine-flushed beauties of Harsha's court (Harsha Carita). In the Mandasor inscription of Kumāra Gupta (175 A. D.), the eclipsed sun was crimson-coloured like the cheeks of intoxicated women. Dandin makes drinking the elixir of all human ills: "Liquor is an antidote to numerous diseases. It fortifies the charms of youth. It neutralizes miseries by increasing self-esteem. It kindles sexual desire and improves the capacity for pleasure. It drowns the consciousness of sin, to counteracting cowardice. By removing the fetters of reticence, it conduces to mutual confidence. By repressing envy it makes for pure joy. It encourages continual enjoyment of music and other sense impressions; the acquisition of countless and varied friendships; unrivalled beauty of person; incomparable graces; martial spirit, resulting from the want of fear and depression".

Grama is a tax-paying holding (Yāj. Vṛtthahāra Prak. 9) as a pasture ground, orchard, cultivated fields quarters for slaves (Vijaya Candrar's Abhidhāna Rājendra). Later with the increases of population, a single taxpaying holding became split up into numerous holdings and developed into a village. A number of villages formed into a *gana* (present *pargana*) where *gana-pata*, commander of 8 battalions (*gulma*) helped the *sthānika* (*sthāna-dar*; *sthāna*—present *thān*—police station) to collect produce rents and to arrest miscreants, thieves, robbers and rebels. Attached to the *sthāna* (*thān*) there was an armed camp (*durga*) under *Durga-pāla* (present *Daroga*). Under the Turks and Mongols and the present British India administration the responsible head of these *sthāna* and *durga* is only one person—*Daroga*—the sub-inspector of police. *Bhata*s and *Caras* were the secret police under the Rājakes, royal family members, employed as governors. They secured their

important and powerful positions by courting and adulating the royal scions. These sycophants became their body guards and confidential messengers. They were both armed or unarmed. Many of the Bhatas used to appear in the guise of ascetics as spies. They used to extract confessions of guilt from disloyalists, rebels and conspirators by torture. Ckrabhāta praveśya is mentioned in the copper plate grant of Mahārāja Hastin (482 A.D.) in which Caras and Bhatas were forbidden to enter into endowed estates except to arrest robbers or persons guilty of high treason. Caras and Bhatas, though trusted officers, were shrewd cunning fellows (Bhatah Carah dburtah). With the downfall and collapse of the Hindu kingdoms the Bhatas became trusted messengers and keepers of the genealogy of the royal houses. *Caras* in Bengali means spy; *gupta cara* = secret service man. Caras became Cārenas, singers of their praise of chivalry and valour. And some became Bhāttacaryas = priests.

The anointing brush was a reed stalk (*sarasaikā*) with a tuft (*Sat. Br. 3, 1, 3*). The performers were generally women (*Vs. 80, 14*). And the eye-lashes were painted with *isika* (*Ts. 6, 1*) and *salakā* (pencil; *Ritu, 1, 4*) by woman, and by men by *salakā* (*Kath. S. 93, 1, Maitr. S. 8, 6, 1*). In some sacrifice it was the duty of the priest to apply collyrium to the eye lashes of the sacrificer (*Vs. 4, 3*). Women were fond of their coiffures. And various types are seen in the Ajanta cave paintings (*16, 17*). Hair-nets (*jālikā*) were used by women to keep their hair unruffled by breeze according to Bṛhas. During bathing body was rubbed with lemon peels; and in shaving soapnuts were used to produce lather (*phenaka*) on the cheeks (*Kama S. 4, 24*). Ornaments (*alankāra* : *S. B. 3, 5, 1*) were used by both men and women, particularly by ladies. To keep the locks in shape, *tirita* (from Achaemenide *tiara* which the Greeks adopted after the ancient Persian fashion), *kirita* (*Ram. Araya 38*), *curamani* (*Vik. 4*), *muktāgana* (*Megha 1, 46*). Earrings were called *karna-śovana*. *Kundala* was worn both by men (*Ayodhya 32, 42*) and women (*Sundar. 10, 13*); *manikundala* and *vaiduryamani* (decorated with *beril*; *Kichikā 10*), *trikarna* (*Sundar 15*), *karnapura*, *karna-bhusana* (*Raghu 7, 8*). Bracelets were called *parihasta* (*Av. 8, 6*), *valaya* (*Ram, Sundar. 9*), *kanak* (golden) *angada*; armlets were called *kancana* (golden) *kayuras* (*Ayudhya, 32*), *angada* (*Raghu*

6, 78). Finger rings were called *anguriyaka* (Av. 20, 128; *Sundar.* 10). Necklaces were called *niskagriva* (Av. 4, 14), *hiranya-
sraja*, *kāncana mala* (*Kiskinda*, 11), *kanthahara* (*Kisk.* 9), *hema sūtra* (chains; *Sundara* 9), *indra nilamani* (set with stones), *muktāvālī* (pearl necklace: *Raghu*, 18, 48), *tārāhāra*, *tārā-
sekharā*. Girdles were called *kāncidāma* *kinkinimālā* (of bells), *mekhaṭā* *Sundar* 9, *Ayudhya*, 78), *kanaka kinkin*, (of bells), *rasana* (*Raghu*, 8, 7). Anklets were called *nupura* (*Araṇya* 52). Jeweller was called *manikara*, who was sacrificed with the reducers and whores as pests of the society in *Parusa-medha Yajna* (Vs. 30, 7). Glass setters were called *Kaśha* (*Tait Br.* 8, 686). Bracelets, armlets, fillets, earrings, ear-studs, anklets, combs, girdles, bead and gold necklaces were used at Mohenjodaro. Conch shell bangles and amulets were also used, generally made of *Fasciolaria trapezium* of Persian Gulf, excepting one specimen of *Turbinell pyrum* of the Gulf of Mannar. Both in Mohenjodaro and Sumer, a fillet, a thin ribbon of silver or gold, whose ends were tied at the back of the head by means of a thread, was used round the head of both sexes to keep the hair in shape. Glazed pottery and faience with vitreous paste have been found at Mohenjodaro, but not true glass. Glass has been found in the predynastic graves of Egypt, including the Hather head of Sequere Date. In Mesopotamia glass has been found in the third Dynasty of Ur. Glass was unknown in Crete before the Egyptian 12th dynasty (2200—2000 B. C.). Nose stud was unknown, for in none of the terracotta figurines it has been found. Cinnabar (Gk. *cinnabari*; Pers. *zanjifrub*; Skt. *sindura* = red sulphide of mercury) has been found; it was used to paint the mother goddesses red at a religious ceremony. It has also been found in Karm tomb of Egyptian 16th century B. C. The curious fan-shaped headdress of the figurines (F. pl. 72, 73, 75) are similar to certain prehistoric figures from Adalia in Asia Minor; it was the headdress of the Phrygians (*Bryges* = *Bhrigus*). Pannier like addition near the ear made a cuplike cavity which was used as a lamp or incense burner of the deity as there are traces of black at the edges of the headdress. Every floor of every house at Mohenjodaro was provided at least with one bath room with sloping drainage. In Mesopotamia only ablution was required before any religious ceremony. This shows

that the people were of very cleanly habits. In addition to many public wells, every house was provided with a brick-built well. The general size of the usual well-burnt bricks used in Mohenjodaro is $11 \times 5.5 \times 2.5$ inches, the same as used by Karigalzu of the Kassite dynasty of 1600 B. C. and used at Ur in the Third Dynasty. The drainage system with soak pits was excellent. At Echnunna (Tell Asmar) in Mesopotamia of 2500 B. C. the drainage system was just as elaborate, but not so well made. At Kaneumbi a thief removed some stolen articles out of the city through its sewers (*Krishna dasipryana Jat* 444). Suranga in Arthashastra is Gk. *syrenx*-tunnel. Alexander's army entered into fortified and walled town of Sangalla through a big underground tunnel. Gypsum of light gray colour was used in certain buildings in Central Street. But in the construction of a drain a high percentage of lime was used as a mortar, not known or used in Mesopotamia or Egypt until a comparatively late date (Mackay : *Further Excavations*, P. 162). For making roofs which were flat, reed stems were laid side by side, and tied by cords. The same kind of matting is found at the sites of ancient Sumer. It is still practised for making roofs in Sind today. It was then as now laid across the roof beams and covered with a thick layer of mud to form a floor. Closed pottery kilns have been found (Pl. 23 in Mackay's *Further Excavations* at Mohenjodaro resembling the kilns of Kish of 2800 B. C., of Susa of the second period and of Jemdet Nasr of 3400 B. C. The main features of all these kilns are a pit for the wood or reed fuel and a domed compartment above to hold the vessels to be baked, and the communication of the two being effected by round holes in the floor of the upper chamber. But the present day Hindhis use open pottery kilns which not only consume a good deal more fuel but produce inferior products. There is a roughly sketched representation of a boat on a pottery (Pl. 69.4. Mackay : *Further Excavation*) with sharply upturned prow and stern, tripod mast with a furled sail, apparently controlled by a single sail, similar to boats in ancient Egypt which were used both for sea and river traffic. There is another sketching of a boat on a seal (Pl. 89A) ; the same type of boat appears on early Minoan seals and cylinder seals of Sumer. Bronze mirrors with handle (Mackay ; Pl. 114, 1 ;

130, 25; 132, 28). A pear shaped mirror, very similar to those of Mohenjodaro, has been found in an Egyptian tomb of 1st Dynasty. The hardened copper sword is quite substantial (Pl. 119, 9). The chisels of Mohenjodaro have double slopes like the prehistoric chisels of Egypt and the earliest chisels of Suse. Saws (Mackay: Pl. 116, 6; 118, 1) and the adjoining part of the blade are set alternatively from side to side, to prevent the blade from binding in a kerf, an arrangement not known earlier than Roman times. No saws have been found in Sumer. Egyptian saws of 6th—12th dynasties had a convex edge, and the straight back was narrower. The copper celt containing 87, 76 p. v. copper, 0.09 tin, 1.42 arsenic, 0.15 iron, 0.14 nickel, 0.26 lead is almost identical with a copper strip of Egyptian 13th dynasty. And arsenic was the earliest hardening element for copper in Egypt. Jatakas mention the following wooden furnitures: paryanka (bedstead, 7), phalakāvana (bench, 31), āsandaka (chair) and vithika cushioned chair: Chullavāga, 6, 24). The clothing and garment materials were many. The dead body was covered by tarpya (from triperna—leaf or bark fibres). Clothes were woven out of woolen (urna) threads (Vs. 19, 80). Sheep's wool was called āvika (Br. Ar. ap. 2, 3, 6). Blankets (kambala) were woven out of it (Av. 14, 2, 66). Janaka gave many blankets to his daughter Sita as a marriage dowry (Bāla, 74). Bharata received as presents from his maternal grandfather many multi coloured blankets (Ayodhya, 113). Kekaya king Yuddhajit sent presents of blankets to Rāma of Ayodhya (Uttara, 118). Blanket makers (kambala kārā) followed Bharata to bring back Rāma from Chitrakuta (Ayodhya 88). When Hanumana set fire to Lanka many blankets of sheep wool (āvika) and linen (kshauma) were burnt (Lanka 75). Linen was the sacred dress as it was introduced by the Aryans. Kausalya was dressed in kshauma (linen) when she was worshipping (Ayodhya 4), on the occasion of Rāma's consecration as heir apparent, Kausalya was dressed in linen. Rāma as well was dressed in kshauma (Ayodhya 20, 6). Kshauma clothes were given by Janaka to his daughters as their marriage dowry (Bāla 74). Dasaratha's wives were clad in linen garments to welcome their newly married daughters-in-law, and in the same dress led them to the temple (Bāla 74). The corpse of Rāvana was dressed in

linen when he was cremated (*Lankā* 113). Kauseya means clothes made out of kusa or munje (*Saccharum spontaneum*) fibres. On the occasion of Rama's proposed consecration the streets of Ayodhya were overspread with pattavastra (fibrous sack cloth) and kauseya (Kusa fibred fabrics). Sita used to wear during her exile yellowish fibre dress (pita-kauseya) while at Pancavati forest (*Aranya* 47). Screens were made of Kauseya (*Dadhī Vahana Jāt.* 136. Pāṇini mentions (4, 3, 32) bark-fibred dress, especially of red-flowered rhododendron (baras) which was called barasī (*Kaṭh.* 8, 15, 4, *Parāh. Br.* 1-2). Though Kārpasa (cotton) was found at Mohenjodaro, yet Kārpasa is only for the first time mentioned in Asvalayana Śrauta Sūtra. Cotton was cultivated on a large field near Baranasi (*Tundilā Jāt.* 383), and there was a cotton weavers quarters in the city (*Bhīmasena Jāt.* 80). The cotton of Sibi country was the best (*Sibi Jāt.* 499). Hampen fabric (sāni) was made from hemp (*Sana* = *Crotalaria Juncea*; *Cannabis sativa*; *Saṅkhāyana Gṛhya S.* 1, 24, 1). Screens (*Adarsa Jāt.* 181), bags (bhaṭṭa) for storage of grains (*Ilia Jāt.* 78) and for shoes (*Mitra mitra Jātaka* 197) were made of its fibres. Tents (mandapa) were made of mixed linen and hemp (*Masaka Jāt.* 44; *Alipachilla Jāt.* 156). From the bark fibres of trees coarse clothes were also made (*Sudhabhājana Jāt.* 525). Silk was unknown. It was introduced into India about 5th century from China where it has been cultivated since 2650 B. C. Kauseya has been by some mistaken for silk, because the Arabic name of silk which Arabs traded with China was called Kusa. In search of Sitā Sugriva asks his men to go the land of *Kosakras* (worms that yield the thread, identified with China, *Rām. Kish.* 40). Sakas made presents of threads made by worms (*MBh. Sabha*). In *Arthashastra* (2, 11) it is called *Cina patta* (China fabric). Kālidāsa calls it *chinamsuka* (*Sakun.* 1). After Chin shi Huang Ti, the first emperor of Chin Dynasty who united the 36 provinces by a central government, in 246 B. C. and built the Great Wall, the united country was called Skt. Cina possibly in 1st century A. D. from which Eng. China has been derived. Indigo (*Nila*: *Saṅk. Gr.* 1, 23, 1) and safflower were used for dyeing clothes blue and orange. Girls were taught the art of dancing by a dancing master (*Nāṭyācārya*) in times of Kālidāsa in a school of music (*Saṅgita sālā*: *Mal.* 1). The dancing

master selected his pupils for the excellence of their bodily forms. When Malavikā presented herself before the king to give a performance, the king said: "O the perfection of her beauty in every posture. Her face with elongated eyes has the glory of the autumn moon. Her two arms are gracefully curved at the shoulders. Her chest is compact with firm swelling breasts. Her waist may be folded within the hands. Her hips slope elegantly. Her body is like the ideal as conceived by a teacher of dancing (*Mā. 2*)." And the art is ancient. All the celestial nymphs as Rambhā, Menakā and Tilottamā (*apsarās*) are conceived as famous danseuses. Even princesses gave public exhibition of their dancing ability. "At the festival of the ball (*kandaka utṣava*) Kandakāvatī with faultless grace crossed her hand and and touched the earth with her flowery fingers' tips. Her black curls rippled as she bowed to the blessed goddess. She held the ball within the folds of her hands, as if it were Kama-deva, her eyes expanding with restless emotion. With playful grace she dropped it on the ground. As it rose sluggishly she struck it with her flowery hand—the thumb, a little bent. Slender fingers extended bounced it by the back of her hand, caught it falling in mid-air with her left hand; she struck it, making it fly like a bird. As it soared too high she taught it moderation. She tossed it from side to side, and soared it again and clasped it with the folds of her hands. Such was her sweet surprising sport, bringing each moment the shouts and murmurs of applause from the fascinated spectators.—Dandin, *Daśakumāra Carita*." At the birth of Hara, not only professional danseuses entertained the public with their obscene dances and songs, even the court ladies came forward to dance in the ecstasy of their joy to the delight of the spectators, but to consternation of the grave chamberlain. "In languid passionate tones danseuses sang vulgar songs, ambrosia to their lovers' ears. With their tossing *tīlaka* and earrings they swayed like creepers around love's sandal tree. Like waves of passionate flood the resonant sound of their anklets added music to their steps." "The court ladies wrapt in loose shawls hanging from their both shoulders swayed as if mounted on play swings. With brows curved in derision of the chamberlains, banding beneath golden girdles round their necks, and

outstretched arms, they looked like love-nets.—*Bāta, Harasa Carita.*"

The people were very fond of meat and spirituous drinks. For the entertainment of a distinguished guest a bull or a barren sow (rebat) was killed (*Āit Br.* 1, 15); a big ox (mahoksa) or a big goat (mahāja; *Sat. Br.* 3, 4, 1). Yajñavalkya was fond of beef of milch cows and bullocks if it was firm and tender (amśa; *Sat. Br.* 3, 1, 2); Svetaketu recommended beef dish before sexual unions for those who want healthy, strong and learned sons (*Br. Ar. Up.*). The meat of game animals like boars (varsha; *Āyodhya* 91) and antilopes (krishnasāra, *Āyodhya* 56) were relished. In Ravana's kitchen boar's flesh was cooked with sour milk and salt (its hide was used for making sandals, *Va. S.* 4, 9); meats of deer, buffalo, cock, peacock, hare and various kinds of fowl were roasted on spits (sālyapakva; *Sundara* 11). The pork of fattened pigs was relished in marriage feasts (*Munika*, 30; *Sakuta*, 285). Iguana's (godha) meat cooked in sour milk, ginger, pepper and salt, was regarded as very tender and delicious (326 *Godha Ja*). Fish curry was liked (*Sundara* 11), caught by fishers; *Ka.* 90, 16) from rivers and lakes by nets (*Maihr. Br. Up.* 6, 26 *Matsya Jat.* 9) or in split bamboo traps (*Kumina; Haritamata Jat.* 239). The fishes thus caught included Rohita (carp), Vāgusa, Pathina, Sakula, sringi, valuka, munja, kakina, kshuramala (sword fish), Tortoises and turtles were also got (*Jāt.* 451, 435, 545, 451, 463). Corals and pearls were also fished (*Suparaja Jat.* 462; *Anavirat Jat.* 105). In the later period in cities and towns meat was sold in public slaughter houses (*Bana, Mal.* 2). And with drinking roasted meat on spits was usually taken (*Sak.* 2). Fowl has originated from the domestication of the red jungle wild fowl (*Gallus bankiva*) which abounds in India and Burma. It is a good eating; but it was domesticated in India and Malaysia for cock fighting by selection for the amusement of the leisurely classes. The Chinese and Japanese developed it for eating. Persians took the breeds of fighting cocks from India. The Greeks took it from Persia. But the Romans changed the game bird as a table delicacy like the Chinese. The rest of the world have got from either of them or as hybrids.

The following occupations are mentioned : plowman (krishivala, *Va.* 10, 14), sower (*vāpa*, *Vs.* 30, 11), miller (*dhanyakrit*, one who removes the husks of the grain, *Vs.* 31), corn grinder (*upalaparakshins*, *Rv.* 9, 112, 9), smelter (*dhamatri*, *Va.* 30, 14), blacksmith (*karmāra*, *Vs.* 16, 27), arrowmaker (*isukāra*, *Vs.* 16, 46), goldsmith (*suvarṇakāra*, *Vs.* 30, 17), jeweller (*manikāra*, 30, 7), carpenter (*tastri*, *Av.* 2, 6, 8; *taksaka*: *Bṛ.* 13; *sutradhara*, *Ayodhy.* 80, 83), embroiderer (*pesitri*, *Vs.* 30, 12), chariot maker (*rathakāra*, *Vs.* 16, 27), bowmaker (*dhanuskāra*, *Vs.* 16, 46), bowstring maker (*jyokāra*, *Vs.* 16, 27), rope-maker (*rajjukāra*, *Vs.* 7, 2, 4), basket maker (*vidala kāri*, *Vs.* 12, 2), blanket-maker (*kambalākāra*, *Ayodh.* 84), female weaver (*vāyitrī*, *Sat. Br.* 1, 2, 1), embroiderer (*pesakar*, *Vs.* 30, 9), perfumer (*gandhajivi*, *Ayodha* 83), stone carver (*prakaritrī*), leather-worker (*carmanan*, *Vs.* 30, 15), potter (*mr̥tipoca*, *Vs.* 16, 37; *kumbhakāra*, *Ayodhya* 83), astrologer (*ganaka*, *Bṛ.* 13), physician (*bhishak*, *Vs.* 5, 4; *Vs.* 30, 10), shepherd (*avipāla*, *Vs.* 30, 11), cowherd (*gopa*, *Vs.* 16, 7), goathend (*ajapala*, *Vs.* 30, 11), horsekeepers (*asvupa*, *Vs.* 30, 11), charioteers, cook, house guards washerman, barber (*vaptri*), water carrier (*parikṣetra parivara*), messenger (*patagala*, *Vs.* 30, 9), bath attendant (*apsitri*, *Vs.* 30, 12), luteplayer, dancer, actor (*natak*), artist (*silpi*, *Vs.* 30, 6), prize fighter (*Maitr. Br. Up.* 7, 8), boatman (*navāja*), mason (*Ayodhya* 80). Towns—*Kampila*, *Kampilya* *Vs.* 23, 18; *Asandhivat* and *Parivakra* (*Sat. Br.*). According to *Jātakas* there were seven great cities (*mahānagara*) as *Campā*, *Rājagriha*, *Śrāvastī*, *Vaiśālī*, *Saketa*, *Kausambi* and *Bārānasi*. There were numerous towns. *Alavi* (*Alavi*, 70 miles south of *Śrāvastī*), *Andhapura*, *Anupiya* in *Malladesa*, *Aristapura* in *Sivi* country, *Asitanjāna*, *Asapura* in *Anga*, *Ayodhya*, *Attaka* in *Anga*, *Bhadrabūtīkā*, *Bhṛighukaccha*, *Brāhmottara*, *Dantapura* on the coast of *Kalinga*, *Desaka* in *Sumbha*, *Gambhīrapattana*, *Haliddavamsa* in *Kalinga*, *Indrapatha*, *Jetumāra*, *Kapilāvastu*, *Kusinara*, *Kaveripattana*, *Kundiya*, *Koli* just opposite *Kapilāvastu*, *Mathurā*, *Mahisatī*, *Mithilā*, *Nandanda*, *Potana*, *Patithana*—*Paichan*, *Pataliputra*, *Potali* in *Kāśi*, *Potali* in *Asvaka* territory, *Boraka* capital of *Sovira*, *Rājagriha*, *Sagala*, *Śrāvastī*, *Sāmkhayaśā*, *Sakala* (*Sialkot*) in *Madra*, *Saketa* (*Ayodhya*), *Sālatūrā*, *Sarka* near *Rājagriha*, *Setavya*, *Sagala*, *Sumsamāra*,

Supparaka, Svataṣṭi, Takhasaṭṭi, Ujjain, Dhārāvati, Rauraka, (Rururaka), Tāmralipti.

Two crops were usually raised in the same field, barley (yava), followed by rice (vrihi: Govila S. 1, 4, 29; Khad. Gr. 5, 1, 5, 37). The crops raised were yava (barley; Av. 1, 52, 2; As. Gr. 8, 1, 22, 5), godhuma (wheat, Av. 12, 42; Ta. 7, 2), mudga (Av. 3, 23, 8-1), vrihi (boro rice, 5, 1492), sālī (scented rice; Kesava jat. 326), ayamaka (millet *Suaŕa Bhoj. Jat. 585*), chanaka (555), māsā (Av. 5, 140, 2) and sugarcane (Av. 1, 34, 3). The vegetables used were gourd (alāva, Kund. jat 70), Kusmāṇḍa (Benicosa serifera; Beng. Chaul Kumrā; Kuddala Jat. 70), cucumber (ervaruka, Sādānta jat. 514), ūg. (dumma, Udamvara Jat 298), garlic (*Suvarna Hansa Jat. 136*), rādiśh (muh, *Pancayudha Jat. 55*), yam (maluva, Kusala Jat. 536). Sesames (*As. Gr. Sat. 1, 9, 6*; *Paras. Gr. 5, 1, 15, 5*; *Sank. Gr. 8, 1, 98, 6*) and mustard (*Paras. Gr. 8, 1, 17, 28*; *Sank. Gr. 8, 1, 3*) seeds yielded oil. Adraka (ginger: *Godhā Jat. 325*), jīraka (cumin; *Romaka 277*), marica (piper nigrum: *Romaka, 277*) and pippali (long pepper: *Godhā Godhā Jat 323* are the spices. Rāmāyana mentions the following fruit plants: Mango, takkola, dārimba, coconut, date, amlaki, tāla, kadali, vilva. Jātakas mention the following fruit trees: Mango, jambu, vilva, vaderi, kapittha, kharjura, tāla, coconut, haritaki, amalaki (*Embilca officinalis*), vibhitaka, tinduka, udamara, khurvinda (*Terminalia catappa*), paṇasa, piyala, lakuccha, kadali, drakes (grapes or raisins). Rāmāyana mentions the flowering plants: Asoka, ketaka, campaka, bakula, rakta (red) utpala, kadanta, mālati, mallikā, padma, karabira, sindhubāra, bāsanti, matulīga, parna, bilva, kunda, parijāta, agura, kala (black) agura, tagara, mandasa, madhabī, banjula, gagupasi (Kishkinda 12, 14), niladhipi (Kishkind 80), jivaka, nila (blue) utpala, lodhra, amula (*Menthonika superba*) and kaundala (Kish. k. 38). Jātakas mention the following flowering plants; Kusumbha (safflower), kanikāra (Sonnli = *Casia fistula*, exceedingly beautiful when in flower, a native of India, but carried to China in 9th century and Egypt in 19th century A.D. Its sweetish pulp between the seeds in the long fistular pod is used as a laxative. Boiling of the pulp however partly destroys its laxative quality), kaṭa kuranda, kimauka,

kadamba, ankola (ankolaka - akarakantha - Atangium or Grewa salvifolia, growing from Eastern India to Phillipine Islands, used in skin diseases), mādhami, juthikā, lodhra, sthalapadma, ketaki, vakula, campaka, asoka, nāgakesara, mallikā, lagavā, nāgavalli, n yagrodha, bandā = bhandila - sirisa, jāti, eumani, madhugandhikā, svetachchā, suryavallis, anoja, vāsanti, kimsuka, padma, elamvarā.

There were guilds (sanga) of wood-workers, smiths, leather-workers, money-lenders, cultivators, traders and pilots, painters, perfumers and caravan-traders according to Jātakas. Of the Maurya period of 4th or 3rd century B. C. a terracotta seal die of the Association of the Trade Guilds with the inscription of *Saha Jitaye Niyamasa*, has been found at Bhita near Allahabad. The trade guild association was situated in a two-storied structure of kiln-burnt bricks, with a rectangular courtyard in the centre with 12 large rooms disposed round it on four sides. Kusana inscriptions mention the trade guilds of Nava karmikas (architects and builders of new buildings), Lohakākāra (ironsmiths), Sabittakara (millers), Nāpita (barbers), Rājoga (washermen and dyers), Gandhika (perfumers), Sārthavāha (caravan leaders). These guilds were known as Sreni and their elected president was known as Sresthin. These guild corporations exercised functional representation in the government. They administered laws among their own members, according to the regulations of their chartered bodies. They even held trust funds. Mathura inscriptions shows that one Kanasarukmāna deposited with the Abittakara and Raka corporations 500 purāṇas as a permanent endowment (akshaya nivi) and to utilize the accrued interest out of it to feed 500 Brahmins every month in a Punyasālā and the surplus to be given in charity to the poor. Kumāra Gupta's inscriptions show that his governor of Kotivarsa Vetravarman had to act in concert with the advice of Nagarasthin (city mayor), presidents of the caravan leaders (Sārthavāha) and undersecretaries (Prathamā kulika - Kāyastha). Even some of the trade guilds had an Associated Chamber of Trades with an elected president, representing the component chartered bodies, as is revealed by a Gupta seal with the inscription *Sresthe sārthavāha Kulika nigama*. Sārthavāhis were caravan directors, that is, traders,

Kulikas or Kayasthas were record keepers like modern civil service men ; nigama is the banker. One seal has been found with the epigraph *evasthi nigamasya*; that is, the seal of the president of the Bankers Association or guild. The state also acknowledged possibly Buddha and Jaina Sanghas who could take an unmarried slave or an adulterous woman into their organization without the consent of the guild as religious guilds, possessing the same rights, and privileges like others. For the Sanci stone inscription states that opāsikā Harivāmini in the name of her parents gave 12 *dīnara*s (Gk. *denarion*, Lat. *denarius*, Pers. Av. *dinar*) as a permanent endowment to the community of the faithful, so that out of its accrued interest one Bhikshu is to be fed at the great vihāra of Kakadabhot; and out of 3 further *dinara* endowments, three lamps of the divine Buddha should be lit in the Ratnagriha. Dandin in his *Dasakumāra Carita* refers to Associated Chamber of Commerce (*vanig jana samāja*) and the town council (*panchajana samnīhi*). The former decided any dispute between their own members. Each member could get full protection and necessary help from the chamber of commerce. Even if a member was arrested in a criminal case and indicted by the state judge (*nyāyā*), he was to be bailed out by the *samāja* and his defence was looked after. The town council had full administrative and executive power over every department of the town welfare management like modern municipalities. This is well-illustrated by Dandin's story. A miscreant offered for sale an anklet to a merchant Anantakirti. Anantakirti recognized it to be his wife's and asked the rogue, "How have you got it." The rogue answered, "I shall explain before the *samāja*". Hauled before the full session of the *Samāja*, the rogue said, "By your appointment I guard the cemetery at night. Once I found a woman approaching a half burnt corpse. When I tried to get hold of her, she escaped, leaving behind this anklet in my hand". This shows that the associated guilds had their own cemetery for the family members of their own constituents. This reveals a higher civic position and status of the trade guilds than the modern Trade Unions. These Trade Guilds had their own practical training schools where apprentices were taken, and when the apprentices (*Antarvāsika* : Anubhūta Jat. 135,

Susima Jat. 537, 473, Mahāvag 1, 36, 1) by training attained competency, they were given full rights of the members, standardized wages, employments, provision for the family in case of injury or accidents, bonus for excessive or better production of goods than the minimum requirements. Roman trade guilds—*Collegia Opificum*—attributed to Numa (700 B.C.)—were numerous. 44 kinds were known to exist in Imperial Rome, including weavers, dyers, shoe-makers, physicians, teachers, painters, goldsmiths, taners, usually belonging to hereditary castes. Throughout the Roman empire from 300 B. C. to 800 A. D. they became powerful bodies with full corporate political, legal and economic rights and privileges.

Gandhara sculptures show that men were either dressed in *dhuti* firmly fastened by a waist band, and over it there is a shawl loosely wrapping the upper part of the body over the shoulder. The long loose hair is tied up in a knot on the top of the head or their curls fall on either side as well as on the back. There is a sandal on the feet. In the other type we find a cloak over a tunic with loose sleeves, and on the head there is either a skull-shaped conical or domed hat or helmet (*usenisa* Av. 15, 2; Sat. Br. 5, 3, 5). Women wear skirt or petticoat. There is either bodice like sleeved tunic above the waist or a breast band above which there is a shawl covering the body above the waist. In the Kushana period the men wear high boots, trouser pajamas over which there is a tunic above which there is an open-breasted cloak-like overcoat and a cap on the head. Women wear sari, fastened by ornamental girdles or tunic. Kushan men had usually top knots on their head. Women parted their hairs on the sides of the head and tied it in the centre in spirals. Women put on heavy anklets and earrings. Chandra Gupta I is shown on one of his coins, wearing trousers, a close-fitting coat, a cap, earrings and armlets, holding in his left hand a crescent tipped standard and offering with his right hand a ring to his Licchavi wife Kumāradevi who stands left to right with a tunic, earrings, necklace, armlets and a close fitting headdress. Kalidāsa mentions that upper part of the body was covered by *uttariya* (=shawl Raghu 1, 42) which Itasing calls *uttarasanga* of the Buddhist monks, and the lower garment *dukulum* (Raghu 16, 4) which

Bāna calls *dvitīyambara* and Itsing calls *nivāsana*. At Ajanta caves (16, 17) of Bakataka Nāgas, soldiers wear a loin cloth and there is a short and full sleeved jacket covering the upper parts of the body. Servants generally have short loin cloth tied round their body above knees, but without any upper garment. Bāna in his description of the chiefs who came to pay homage to Harsa says of them : They wore jerkins (*kanuka*), cuirasses (*kupasaḥ*) worn over them, coats and overcoats (*adhiḥvāsa* Sat. Br. 3, 2, 1), showing clusters of bright pearls, jackets (*colakāḥ*) of various colours and shawls (*uttariyāḥ*), colorful like parrot's tails ; waist bands (*sastam*) made their waist much thinner, already thinned by exercise. They had saffron-colored linen turbans (*kṣauṃsa colāḥ*) inlaid with crest gems. Women put on bodice (*stānāmsuka* or corset (*kurpasaka* : *Ritu* 6, 4), tightened close by bands (*bandhanāni* : *Ritu* 6, 8). The other garment was skirt (*amuka* ; *Raghu* 8, 75) which fell from the waist to the ankles ; it was fastened by a waist band (*nivibandha* : *Kum.* 8, 60) ; over the waist-band was worn the decorative girdle (*kṣauma antarita mekhala*). In Ajanta caves (16, 17) women wear gracefully loose striped sari with half or full armed bodice, kept in their place by a girdle. Sometimes a petticoat (*pulaka*, occasionally embroidered) was worn beneath the skirts as Bāna describes Malati's dress. Men kept top-knots (*sikhā* : *Raghu* 16, 43) in which a thick bunch of flowers was tied (*Harsacarita*). Bāna decorated his ears with *Giri Karnika* (*Clitoria termantea* = *aparajita*) flowers fastened with Darva grass. When visiting Harsa's court, flowers of Kadamba (*Naucllea kadamba*), Campaka (*Michelia champaka*), Lavalī (*Averrhoa blinbi*), Sephalika (*Nycanthus arborescens*) and Priyangu (*Amaranthus caudatus*) were used for the same purpose. Harsa used to encircle his locks with a wreath of jasmynes. After hair dressing with hair comb (*kankatika* : *Ram Ayod* 91) the body was anointed with white sandalwood paste (*anulepana* : *Ritu* 5, 5 ; *angarāga* : *Kum.* 79). The hair was perfumed. On the forehead a mark (*tilaka*) was made either with sandalwood, *haritālā* (yellow orpiment), *manasila* (red arsenic) or saffron paste (*Ritu* 1, 2). Women dyed their lips and sometimes their feet and nails of their fingers with *ālaktaka* (lac-dye) ; but to reduce the vivid redness and to

perfume, *lodhra* (*Symplocos racemosa*) dust was sprinkled over the lips. For the festival of sexual unions women drank heavily as they thought drinking not only enhances sexual desires, it takes away all reserves, thus increasing free and frank comradeship, consequently lending charms, and applied sandalwood, priyangu, mango-ginger (*kahiyaka*) and saffron pastes, sometimes mixed with musk (*kasturi*, Rām, Lapka 7b) on their white breasts, cheeks and forehead (*Ritu* 5, 9) for the kissing delights of their husbands. Sita asks Hanumān to remind Rāma that with his own hands he one day painted her cheeks (Rām. Sundara 40). Then she looked at herself in a mirror (Kum 4, 7). At Ajanta the mirror appears to be oval with a handle.

Viśvavarman, feudatory of Kumāragupta in his Gangadhar stone inscription of 423 boasts that he adorned the town (Gangadhar) "with irrigation wells, lakes, temples and halls of gods, drinking wells and parks of various kinds with long waterways". Kumāragupta in his Mandasor stone inscription of 473 describes how in Dasapura (Dāsor) "the very white (white-washed) and extremely lofty buildings have waving flags on them, and the roofs of buildings are arbores with groves of plantains, and rooms are vocal with song and have pictured representation (mural paintings). Here cleaving asunder the earth (with deep foundation) there rise up houses, decorated with succession of stories". Bana in his Harsa Carita gives a vivid description of village near Sthaneshvara; "On every side there are rice heaps on thrashing floors. Rice fields are strewn with cummin plants watered by the Persian Wheel. On the high land there is the wheat crop, variegated with Rājamaśa (*Phaseolus*), patches ripening and yellow with split pea pods. Farmers, mounted on buffaloes with the tinkling bells round their necks, are watching their cattle, reveling on Vāspachedyo grass. Camels are here and there. Pot herbs and plantains are on all sides of the villages, darkening the soil; vine groves and pomegranate orchards. Homes were furnished with cane chairs (*vatrāsana*; Kum 8); on cots (*mānasa*; Raghu 8) cushioned mattresses (*saityā*; Raghu 8) were spread over which there was a cover (*astarāna*; Raghu 6). Sundials (*śāyadanda*; a rod placed in the centre of a circle, and by the length of the shadow cast by the rising and declining sun, day time is determined), sand and water clocks (*ghaṭa* in which sand or

water was kept and through a hole at the bottom they emptied themselves, devices of very ancient Egyptian origin thus to find out time). From *ghata*, a small pot, *ghatika* time keeper. Artha-Bāstra 3, 6) mentions a water clock. In Jayara Varman's Harshar inscription it is called *Nārika*. "The time of victorious one is determined by water clock (*Nārika* = water channel) even at night. In the Wata inscription of Maitraka ruler Gubasena of 566, it is called *Ghata*. "Garden (*pramada vana*? Kali. Mal) was the decoration, and orchards (*Griha upavana*: Raghu 8) were the ornaments of every household like parks (*nagarapavana* Sak. 1) as pleasure gardens (*pramodavana*, Vik 2) are to a city. These gardens and parks were irrigated by canals (*kulya*) as well as fountains (*variyantira*, Mal. 2) which carried the running waters into little channels (*ālavāla*, Raghu 12) which were formed round the trees for their suction. These parks and gardens had lakes dug out (Raghu, 10), artificial hillocks (*kṛira saila*: Megha 1) for peacocks to dance and display their plumage, shady bowers of flowering creepers with seats, raised platforms (*vedika*) and swings under groves of trees (*Kum.* 3). Garden keepers (*pramada vana pālaka*: Mal 3) attended the plants with watering pots with perforated nozzles (*śaṇṇaṇṇaṇṇa*: Sak. 1). Gangadhar stone inscription of Visavarmā of 423 speaks of palmyra palm (*kula śila*), the red flowers of *bandhuka* (*Terminalia tomentosa*), the purplish-blue flowering of *Bāna* (*Baleria ciliata*). Kamasrāgupta in his Mandasor inscription of 473 mentions the flowers of Lodra or Radha, Priyangu, jasmīns (*Jati*, *Jati*, *Mallikā*), *Jāvali*, *Asoka* (*Saraca Indica*), *Sindhuvāra* (*Vitex negundo*), *Ketaki* (*Fadenus odoratissimus*). Hastin in his Khos copper plate refers to *vaka* (*Sesbania grandiflora*), *amṛita* (*Spondias mangifera*) trees. The flower plants and fruit trees of Asoka park of Ravana were planted by experts (Ram, Uttara 52). The park was furnished with lakes, having rows of trees planted on their banks, pretty groves and raised seats here and there. *Bakula*, *Kadamba*, *Ketaki*, *Campaka*, *Aguri*, *Sirisa*, *Lodhra*, *Matulīngā* (orange), *Mallikā*, lotuses, water lilies, *Amra*, *Darimba*, *Kharjura*, *Amalaki* (*Phyllanthus emblica*), *Kadali*, *Tala* and *Vilva* are mentioned.

Avantivarman in his Nagarjuna Hill cave speaks of lovelies-bleeding (*priyangu*) and *Minusopa elengi* (*vakula*). Kalidāsa mentions *Tamāla* (Raghu 13), *Puga* (Raghu 4), dates (*Kharjura*

Kum 4), Kadamba (Baghu 15 : *Arthocarpus* Cadamba), Madhuka (*Pygea* 6 : *Basia latifolia*), Tambuli, Nāgavalli (Baghu 4 : *Piper betel*) and Parijāta (coral tree = *Erythrina indica* which produces crimson flowers).

Susruta (2, 24, 5, 4) says that one on rising should cleanse his teeth with a tooth paste consisting of *trikāta* (*Terminalia chebula*, *T. bellerica* and *Phyllanthus emblica*), *trivarga* (cinnamon, cardamom and cloves), salt and oil; wash his mouth with a mouth wash; wash his eyes; apply collyrium to his eyes; then chew betel leaves along with spices like clove, camphor, nutmeg or musk seeds. Before taking his bath he should rub oil on his head, massage his limbs (*udgārtana*), take exercise and then bathe himself. After that one should anoint his body with a fragrant paste. His hair combed, nail paired, well-shaven, ornaments worn, some scents sprinkled over his body, wearing leather shoes, taking with him a stick or an umbrella he should go out.

"A dwelling should be situated in a large town where the citizens are influential, or a pleasure resort may be chosen. There should be water-supply nearby, an orchard, a large parlour for one's own work and two rooms. In the reception room there should be a soft mattress bed with a white covering and another bed alongside. Arranged but within easy reach, there should be salve, garlands, parched rice, scents, lemon peels and and betel; on the floor a spittoon and a dicing board, and on the wall a lute. In the orchard there will be swing and a bench in an arbor. On rising in the morning a citizen will cleanse his teeth, rub himself with a salve, hold fumigating stick (of carae for its exhilarating effect), take a stick and a garland, chew a mouthful of pupped rice and betel. Then he will paint his lips and examine himself in the mirror. He will bathe every day, anoint himself every other day, shave his beard every fourth day, and every tenth day shall go over the entire body with a razor. Three meals are to be taken daily—morning, noon and evening. Morning may be spent in games and amusements, afternoon with friends, cock-fighting or teaching parrots to talk and evening with music. Public promenade should occupy a part of every citizen's time and the citizen will be seen elegantly dressed in company of courtesans, followed by a retinue of servants (*Vatsyana's Kāmasūtra*).

The Egyptian funeral barge of 1400 B. C. represented Argo Navis, the ferryman being the hawk-headed and eyed Horus (Agastya), ferrying the dead to the land of Osiris (Yama), the god of the dead who sits in judgement on his soul. There was an eye (oculus) painted on the low prow of the barge representing the eye of the hawk-headed Horus. In the fore part of the Greek of galley from a vase in the British Museum of 500 B. C. there is the same eye. The Imperial Roman ships had also their eyes. It seems that the ships of all Mediterranean races used the Oculus as their symbol. The boats on the Ganges are high-sterned and low-prowed like those of the Egyptian. There is the same quarter-steering paddle provided with a crossbar or tiller at one side at some distance from the end for its manipulation by the steersman. There is the same oculus and the square sail. In the Ajanta cave frescoes of about 600 A. D. there are representations of a three-masted ship and royal barge, provided with oculus on the bow. It seems that the Manus (Mediterraneans) introduced them into the Ganges and Yamunâ. Mediterranean crania have been found at Mohenjodaro. The raft of inflated skins (*saranai*) is used in the rapids of the Ganges above Hardwar. Similar rafts of inflated skin are common in the Assyrian sculptures, depicting the triumphal campaigns of Sennacherib. In the Cavary and the Tungâbhadra there are *coracles*—wide-mouthed, flat-bottomed circular baskets over the outside of which is stretched and fitted a hide covering to exclude water penetration, used in ferrying passengers across the rivers. It is like the Arab *Guffa*, used for the same purpose on the Tigris and the Euphrates, where however, instead of hide, bitumen is used as a waterproof. Herodotus however states that Assyrian merchants used to carry their products down the Tigris in hide-covered *guffae*. A Polynesian migration through the sea might have extended through Malaysia, S. India (including Ceylon) to Madagascar. They introduced single outrigger float canoes. Parawa fisher tribe of Tuticurin betray many Polynesian physical types. In Madagascar pre Hosa Malayasy tribes show also many Polynesian traits. Malayasians (Lahvana, Shanors) introduced coconut cultivation in S. India and Ceylon, and double outrigger vessels. Coconut is of Polynesian origin. But it was acclimatized in

Malaysia. Hovas of Madagascar have Mongoloid Malay features. They introduced double outrigger float canoes and vessels there. Borobudur sculpture frieze relief ships of 8th and 9th century show double or tripoid compound masts with a powerful outrigger and rudders set in trunkways. Andhra coins of 2nd and 3rd century A. D. show square rigged two masted (but without any double or tripoid base) sea-going vessels with raked stem and stern, both stout, without bowsprit and ruder and steered two quarter paddles.

Bavari Jataka mentions the export of peacock to Babylon in Indian ships who steered their vessels by the direction of the position of constellation and by the landing of crows.

Solomon imported ivory and peacock from S. India. Though the time in which it was composed, is not definitely known, Old Testament word Thuki—Tamil Tokai. Peacocks were common imports in Greece by 480 B. C. Jatakas mention the sea ports of Bharukaccha (Broach), Suparaka (Sapara) and Tamralipti (Tamluk) from which long and dangerous overseas voyages were made particularly to Suvarnabhumi (Golden Chersonese—Malayas). In the ruins of Birs Nimrud and Ur of about 604—538 Malabar teak has been found which was certainly carried by ships. In Achaemenide Susa, libation cups, bangles and ornaments made out of Kathiwar conch shells, and fragments of Malabar Teak have been found. At Tello (Elamite Lagash) Kathiwar conch ornaments have been identified (Louvre Museum). Darius employed the Greek navigator Skylax of Karyanda to link the Indus with Egypt by sea communications. Herodotus (4, 44) mentions that the sea voyage from Indus ports to Egypt took 80 months. Darius completed the Suez Canal, began by Pharaoh Necho for the continuous voyage from the Persian Gulf and Indus coast ports to the Mediterranean harbors. Alexander sailed from the Hydaspes in a fleet of 1800 ships which included long narrow war galleys, the round shaped merchant men and the transports for carrying horses and provisions to feed the army. The commanders of 33 war galleys were all Greeks with the exception of one Persian. The ships were designed and built by the Phoenicians, Cypriotes, Egyptian and islanders in the army of Alexander, from whom all those who were skilled in seamanship to manage the vessels and work the

oars, the crews were selected. Ptolemy Philadelphus opened the port of Berenice, due east from Assuan in 285 B. C. for direct shipping trade with the Indus ports. The merchandise landed at Berenice was carried on camel back 258 miles through the desert to Koptos wherefrom barges carried it to Alexandria. In 274 B. C. a new harbor was opened at Myos Hormos which involved only a desert caravan of 100 miles. At the time of Ptolemy of Alexandria ships sailed from Myos Hormos for Muza (Mocha, the Sabaeen port at the southend of the Red Sea), then Endaimon (prosperous—Aden), Kane (Hism Ghorab) and finally Berugaza (Broach). Broach was a flourishing Greek trading port at the time of Demetrius and Apollodorus. According to Periplus Barugaza had a large trading fleet for Scythia (Sind called Scythia for being occupied by Sakas at that time), Omara (Oman) and Persian coast. A third fleet sailed directly for Malabar Straight across the Indian ocean from Cape Guardafui. The Greek historian Agatharchides, the contemporary of Ptolemy Philometor (181—145 B. C.) describes Sabaea as opulent as the exchange marks of Indian merchandise. He states having seen large vessels coming from Potoma (Patala) on the Indus and great numbers of Indian merchants who resorted to Sabaeen ports. Mauryas had a fleet of armed vessels to protect the Indian coast. According to traditions Indian traders had been attacked in their voyaging nearing Malaya by Nāga pirates who plundered and destroyed their ship. Asoka sent an armed flotilla to capture the Naga pirates. There is a port Nāgapattan in Madras coast, a settlement of Nāgas. It is possibly Malla Nāgas, after whom Malabar and Malaya, as well as Nayar (= Newar of Nepal, a prakrit form of Nagar or Nāga) had been developed. Pallavas seem to be a branch of the Mallas as their names betray. According to Pliny (6, 28), the Romans had extensive trade with Pandyan ports of Cranganore (Muziris), Mangalore (Nitria), where spices particularly were bought to the ships in single-logged Polynesian Catamarans (cottonam). From first century B.C. from Tāmralipta, and by the Andhras, Pallavas, Cholas, colonies have been established in Malayas, Siam and Cambodia (Champā), Java and Sumatra. Fahian sailed from Tāmralipta in 414 A. D. to Ceylon in a great merchant ship. In 578 I-tsing found Tāmralipta (Tamluk)

which is mentioned in the Jātakas, still a prosperous port wherefrom he embarked for China. In the first centuries of our era Telanga (Pegu peoples were known as Tailang) and Kalinga (Godāvari region) great waves of immigrants settled in Burma, Sumatra, Java and Cambodia with high colonizing energy and trading developments. Cholas invaded the Barmess coast about 1024 A.D. In the early Tamil poems there are frequent references to voyages of merchants to Nāgapuram in Chavakam whereby Sumatra and Java are understood. Nāgapattam (port of Nāgas) and Nāgapuram (settlement and cities of Nāgas) might have been the colonies of Malla Nāgas. According to the Javanese legend it is mentioned that in 603, 5000 men arrived from Guzerat in a large and 100 small vessels to Java. They were later reinforced by 200 artisans. These might have been Nāgas who were also called Malla Nāgas. In Rāmāya (2.52) it is found, "there is a saying in Guzerat, who goes to Java never returns. If by chance he returns, then for two generations to live upon enough money he brings back. In the Chachnāma, it is mentioned that a Sind pirate ship looted a merchant vessel with valuable gifts sent by Ceylonese king to Khalip Muways (661-679), which resulted in the invasion and conquest of Sind by Arabs. This shows that India has always been a maritime power from early historic times. Even in the R̥gveda 8.81.8, we find that the Yādus (Yutians) and Turvasus (Turans) came over stormy waters, but the Maruts, wind god of the Amorites, were favourable (Rv. 8.7, 18).

12 - INDO-IRANIAN CONTACTS

Shushinaks (Akkadian, Sumerian Nim-shushinak; Elamite In Shushinak, In-Shushnak, Scas of Sogdania; P̥urānic Sasanāg; = Sisunag; Chinese Hsiengnu = Alpines) are found in Eastern Iran, particularly in Elam (called from hoary antiquity, and from whose settlements Sasa has been named. Yuteans (Yādavas), another Alpine tribe who occupied the territory previously, were forced south by their pressure and of Paraces (P̥urānic Pura = Khatī, also Alpine but hyperbrachycephalic

with aquiline nose and the nose in straight line with the forehead). When Naramsin brought the territory under his control, there he found In-Shushinak temple in which in a somewhat later strata serpent heads made out of lead, bronze and gold-plated silver have been found; other deities were Nabunia and and Narada (Nārada †). In central and northern Zagros, Naramsin, himself a very tall dolichocephalic leptorrhine, Caspian, but with broad face, met with other Caspian tribes—Kassai (Kassites: Pers. Kossaeans; Gk. kossaioi; Aram. Quesaye; plu. Kasip, attested by Gk. Kaspior, Caspian Gates, Caspian Sea; Purānic Kasi of Kasi Dynasty; Kāsyapa) of Kar Kashahi (Kāsi—Benares), in the east Ellipi, to the north Lullibi and Gutī (Gudean Dynasty of Babylonia; Gadhi dynasty of Kānyakubja), and adjoining them Urartu (Urartians = Haldians from whom Ararat has been named; Purānic Aratta; O. P. Artax). One of the three rock sculptures at Sarpul, on the Bagdad Hamadan road, shows a king of Lullu, Annu-banini before a goddess Nanna or Akkadian Inninna. The king puts his foot on a conquered enemy while the goddess leads two more captives, similar in style to that of Naramsin's famous stele. The second Sarpul rock sculpture shows a king with a defeated enemy before the symbol of the sun and crescent, on the base of which there is a body preserved in Akkadian inscription. The third sculpture shows before the goddess without any inscription. The Naramsin stele at Louvre shows Naramsin as the conqueror of Lullu. So the Sarpul inscriptions are at least a few years older than that of Naramsin which is about 2340 B. C. From Anubānini, the region might be called O. P. Kampanda, Bit Hamban. Kutir Nahhunte of Sushinak dynasty of Elam (1171-1166 B. C), defeating the Kassite ruler Enlil Nadinahhe in 1771, took Nina (Rv. 9.712,3), the lady of Uruk to Susa where she was retained for 1535 years and where the trophies were dedicated to In-Shushinak with a new inscription, and which was taken back by Assur-banipal of Assyria (668-626). According to Babylonia king Nebuchadnezzar's (1136-1148) inscription, Marduk himself was carried off to Susa. Not far to the northeast of Sarpul, at Horen, there is another rock sculpture of Sar-bānibāni (a mixed Akkadian name), son of Ikhip-sahmat, a Sub-

artean (Suvarṭu : Purāṇic Sambara, Sabara—Cimbri) of the same age, if not of earlier period. These Caspians wore a simple loin cloth, but many ornaments. Their weapons were a bow, a sort of boomerang, a metal axe and a prehistoric stone axe.

In 1945 as Larsa was attacked by Amorite (Pur. *Amara*) Hammurabi (Kahamarabi), Larsa appealed to Elamites to come to their help. As Elamites answered the appeal by attacking Subartu and Gutium, Hammurabi swept through Larsa and overwhelmed Elam, bringing out the collapse of the reigning family. One Addabushuz, who declared himself a son of a sister of Shilhaha, and a shepherd of Shushinak, was put on the throne of Susa. But Shutruk Nahhunte (1207-1171) of Susinak dynasty revenged this outrage with his son, Kudur (Pur. *Kadru*). There was a Kuduru people on the bank of the Tigris in the region of Der. Nahhunte (1170-1166) captured 700 cities as far as Mara of Babylonia. From Sippar he took Naramsin's famous Stele of Victory, and the great stone slab bearing Hammurabi's Law code; a portion of the latter was erased for his own inscription which however, was never filled. Near Kish he seized as a trophy obelisk of Maneshtusu. He had conquered the whole of east Tigris territory close to the lower Zab and built numerous Sushinak temples. Susa became very rich from the inflowing wealth of the extensive empire, and many business and commercial houses were built. Sushinak temples were enriched and enlarged. Shilhak-in Sushinak completed the Sushinak sanctuary which his brother had begun. At the side of his brother's statue he placed his own image of baked brick, and surrounded the temple with the bas-reliefs with the prayer that Sushinak look with favour on his good deed. He also erected 14 foot square Sushinak sanctuary which has been uncovered in the southern part of Susa and which housed the superb limestone statue of Pujar-in-Sushinak. The winding stairway of 120 steps descending over 84 feet to a lower level of the mound led to a similar temple. Two massive temples arose on the southwestern corner. Architectural drawing on fragmentary clay tablets and the actual model on a low bronze table, surrounded by a reproduction of these temples, the smaller two-storied, and the larger three-storied, enclosed by sacred

groves of trees which Ashurbanipal (668-626) destroyed at Susa. Some 500 years later temple towers of glazed brick with horns of shining bronze and sacred groves into which no stranger penetrates, whose borders he never oversteps. At one corner of the table an inscription tells how Shilbak-in-Sushnak made this bronze object and proclaimed its name, *The Rising Sun*. On either side of the temple gateway stood a life-sized lion of glazed clay. The gateway swung on huge inscribed stone sockets whose inscriptions list the names of kings who constructed Sushinak temples. The temple walls were made of unburnt bricks, veneered with well-baked or sometimes glazed bricks, recording the names of famous kings who had erected Sushinak temples. Within the building columns of inscribed triangular bricks supported its wooden roof. Beautiful glazed bricks, singly and in reliefs, added the necessary color to the interior walls. But one curious bronze relief portrays a number of warriors, marching in a single file; all identically clad in helmet with printed visor, sleeveless jackets, short skirt and upturned boots; a short curved sword is held aloft in the right hand, a bow is suspended from the left, a mace is thrust through the skirt while a strap over the right shoulder supports a quiver on the back, (Khatti). The inscription on it is illegible. The temple altar was guarded by an inscribed rod, a hollow cylinder over 14 feet long, cast in a single piece. The inscription describes its dedication to In-Shushinak for the longevity of the ruler and his family. The same inscription mentions that he placed upon the altar magnificent likenesses of Shutrak Nahunte, Kudur Nahunte, himself, Nahunte Utu, Shimut-nikalash, his brother and all his children. Near Kurangan a wall of bricks inscribed with the name of Shutrak Nahunte (1207-1171) has been found.

Amorites were known in Assyria as Amurru, Vedic Amra (Rv. 7, 61, 5), in Egypt as Amar, Puranic Amara, and in Babylonia as Martu. From Martu, Kassite Maruttas, Marduk. Vedic Marut and Roman Martia have developed as war god which became identified with reddish wandering planet Mars. The Amorite king Khuvavash, contemporary of Naram Sin of Agade (2580 B. C.) and mentioned in the Khatti inscription is an Aryan name. During the reign of Amenemphat III. of

Egyptian Twelfth Dynasty (2600-1721) in the Benishassen of his governor Khnumhotep, there is a basrelief of 89 Amorite men, women and children, blond tall long-headed with blue eyes and thin lips. They were also armed with bows, javelins, axes and clubs. About 2057 B.C. Hammurabi (Khammarabi) of Mari fought for sovereignty and he succeeded to dominate Babylonia, being pressed from behind by the Khattis and Mitannis. By 1758 the Khatti was the most dominant power in Asia Minor and had not only vanquished Khalep (Mitanni) but even overthrew the powerful Amorite Hammurabi Dynasty. It seems also that Mitannis were also a branch of the Amorites. For in the treaty of 1260 B. C. with the Khattis, Mitanni ruler calls his people *Harri* and his fighting nobles *Mariannu* (the capital of the Amorites, particularly of Hammurabi, was called Mari. Mari is the abbreviated form of (Amara, Merak, a fighter and a lover of Avesta; Marya, a hero and a gallant of the Bv. (2, 10, 5; 10, 27, 1). They were tall dolichocephalic fair complexioned Caspians. The Gudeans, represented by the Gadhia of Kanyakubja and present day Kurds, were a branch of the Kassites, mixed with Mitanni Amorites; and in the Puranas Gadhia were called Kassikas, who came as a rear guard of the Kasis (Kassas) who established the Kasi kingdom, displacing the Purus (Khattis) in the Gangā Yamunā plains. After these Kasis (Kassite), Kashmir has been named and are still represented by the Khos and Khas in the Himalayan regions. *Kasyapas* formed a priestly clan of these Kasis. Though the Kassites (Babylonian Kassu, Egyp. Kush; Bib. Kushite, Ir. Cossaei; Pur. Kasa. Khasa, founder of Kasi Dynasty), many of whom from Zagros Range served as army officers of the Amorites, occupied and ruled Babylonia from 1740—1150 B. C. One thrust of the Khattis reached Ansum and was known as Parsas (Puranic Purus). The Sateu-speaking Hittites were called *Purush-Khatti*. At Kurangun near Persepolis Khatti rock sculptures in profile have been found, depicting a divine couple with worshippers. The god sits on a throne formed by a coiled snake. In the crown of his head there is a pair of horns. In his hands the god holds the vase (Aquarius) with the water of life which is flowing towards worshippers on both

sides. In front of the god is an object similar to certain Hittite altars. The goddess smiling is sitting on an animal. The god and goddess wear long side curls like the Hittite heads of Tell Halaf. Men worshippers wear short skirts, reaching down the knees, and the women longer ones like Hittite trailing skirts. Men wear long pig-tails as found among the Hittites of Asia Minor and Hyskos of Egypt. The portrait heads, numbering about 40, are all Alpines with prominent nose in straight line with the forehead without any nasal bridge. A replica of Karangun sculptures existed at Nakahi Bustam, the burial place of the Achaemenides. At the end of 3rd century Bahram II had a new sculpture executed over the old one of which only the coiled snake and a standing attendant are still discernible.

Though the Kassites were Caspians, the horse was a divine symbol to them and horse became familiar in Babylonia after their occupation of the land. Though they had Caspian god like Shipak and Kashshu and goddess like Shumalia, *the lady of bright mountains who dwells on the summits*; they had also Aryan gods like Shuriash (*Shuwar* in Amarna letters) = Surya, Marutash = Marut and storm god Burias = Gk. Boreas. Marutash has been borrowed by the Kassites from the Amorites. Possibly Shuriash and the worship of horse from the Mitanni who were their close neighbours in North-West. Mitanni (= Mithili; Mitra = friendly, allied; anika = army = allied army) were Aryans of centum variety of speech. They entered Mesopotamia as a horse breeding and fine-iron manufacturing aristocracy from the Caucasus region, for in one of their chariots in Egypt, birch fibres have been found; the birch that grows only in Caucasus Mounts. The Kassites descended upon Babylonia from central Zagros. The great grandson of their third king — Agum Kakrime — claimed suzerainty over Gutti, Padam and Alman in Holwan region. The neolithic (Ketteminar) culture of the of Ur region is connected with N. India, Persian Gulf on the other and the Urals and S. Siberia in his east by similar flint finds. A large number of ornaments have been dug out, made of shells which are found only in the Persian Gulf, Arabic Gulf and the Red Sea. In Southern (Afanasiev culture) Siberia, a number of shells which are met with only at the mouth of the Oxus. In the Bronze Age the Oxus culture is connected and

similar to that of the Ukraine, the Volga and S. Siberian steppes, but quite distinct to that of Anau culture. In the later period both cultures seem to be mixed. From the early bronze to the early iron age the people lived in the communal houses, oval in shape, 22 by 16 meters in area and 10 metres in height; the high conical roofs of these houses were supported by a complicated system of pillars and beams. In the centre of each house stood the sacred hearth, the fire of which was never allowed to go out. The peoples cooked their food at other hearths, placed around the sacred fire. The site of this hearth was marked by a thick layer of pure white ash lying on sand that had been burnt red to a great depth. This is the Aryan-vejo, Kangha (Khwarizm) of the Iranians, Kang kien of the Chinese, Meru (Merv) of the Hindus. Soon after huge canals were dug out for irrigational purposes about 8-7th century B. C., and fortified mud villages with walls are found over their banks. It is the city of dwelling walls, a huge fortified settlement, the whole interior of which, a space of about a square kilometre (Yima's square vara), was devoid of all buildings and served as a gigantic cattle-pan. The people lived in dark, narrow, passage like rooms with arched ceilings, built in several rooms, in the thickness of the city walls which were in places as much as 18 metres thick. Pictographic and hieroglyphic inscriptions found show their close resemblance with those on the seals at Mohen-jodaro and with the Hittite and early Elamite hieroglyphic writings. During the Kushan (Kangia-Siyavusheds) period (1st-2nd century A. D.) the Oxus civilization reached its highest glory. Kushan empire extended to N. India in the West and Sinkiang in the east. Irrigational canals increased in number and extended and penetrated into the desert. Numerous towns sprang up along the banks of these canals. Delicate porcelain work, numerous and varied statues of human beings and animals in a synthetic Greco-Buddhist style, carved stone seals with representation of deer wounded by an arrow, griffons, horsemen, speak of an original and very high development of art and industries. Instead of communal fortified area, there is a fortified family dwelling with a large number of rooms, fronted by a big courtyard, surrounded by brick walls. It was a slave owning patriarchal aristocracy. It was replaced by the

feudal Afrighid dynasty, related to Iranian Khosows, Siyavusheds, a Kushan clan, and Parthian Arsakid dynasty and Aspargia dynasty of Crimea. Afrighidal had strongly fortified castles, having high towers and living rooms in them, entrance to which could be effected only across a drawbridge leading from a smaller tower. Agriculture still depended on slave labour, but feudal system was developing. The bones of the dead of the family after the flesh had rotted away were buried in one large alabaster asanary, kept in one of the rooms of the tower. The warlike towers were replaced by graceful houses with high arched entrances, artistic paintings on the clay walls under the Huns. The eastern grannery with numerous Oxus canals ceased to exist after the Mongol raids who destroyed the intricate irrigation works which made the Oxus region as fertile as that of Babylonia and of Egypt. Mihir Yast (14) states that Mithra beholds the broad navigable waters hastenning towards Mouru (Hindu Maru = Merv), Harayu (Aria) and Gava Sughdh (Sogdians) and Hvarzen (Chorasmin). The three rivers are Arigwa, Arina and the Oxus.

Shalmaneser III of Assyria, almost a thousand years after their entry, found in Namri, a territory of Lullubi, a ruler *Iansu* whose name is merely the Kassite word for king. In the hill country to the east and north east of Babylonia, the name of the Kassites lingered on into classical times among the Kissean and Kossean tribes, and the land as well as its capital in central Zagros was known as Kar Kashshi. Inscriptions of the Kassite rulers, though nowhere numerous, are totally lacking in Susa. Mithra was the supreme god of the Mitannia, especially invoked in treaty obligations, noted for truth and honour, with other gods Varuna, Indra and Nasatya. Mitannian Mithra became the supreme god of the Iranians. Mitannian *Marianno* means a hero, fighter and noble; but it degenerated in Avestan *Marak* and in Rv. *Marya* (2, 10, 8; 10, 27, 1) as hero and a gallant lover. Mitanniens occupied Luistan in 11th century B. C.

Assyrian ruler Shalmaneser III in 156 found in Zamna two Caspian chiefs—Nikdime and Nikdiara. In 848 a ruler *Iansu*, meaning in ancient Kassite as king, was recognized as an Assyrian vassal in Namri. His revolt in 835 was the signal for

further Assyrian conquests in the east. Namri and Parsua were entered; the land of Madai (Medes = Manda Cimmerians) was encountered near modern Sakin. And Assyrians began to learn of Patishvāra, a narrow strip of cultivable land between Demavand (Alburs) and the interior salt desert and in further east of the *Pārthavas* (Parthians). In Esarhaddon's annals *Patisswara* is called *Patusarra*, in Darius inscription of Behistan *Patishvāra*, Gk. *Pataiskhoreia*, Sassanin *Patiskhargar*, Ir. *Khwar*. *Patishvara* = lord of heaven, that is the mountainous region. It is a pure Aryan word where it is not changed into *h* due to Saka influence. As it is first mentioned in 685 B. C. the Aryans did not enter this region before 900 B. C. But Urartians (Haldians) entered into Parsua west of L. Urmia and left a state in Keleshin Pass. Shamshi Adad (825-812) advanced into Mannai (occupied by the Mediterranean peoples; *Pur. Mannu*; Egypt. *Menes*; Cretan *Menos*) and Parsua. Mountainous region was occupied by Caspian peoples as *Bit Kapisi*, *Kishusa* (*Kisheein*). From *Bit Abdadam* (Mt. *Bikni*, the mountains of lapis lazuli - Demavend) annually 300 talents of lapis lazuli was supplied to the Assyrians. Sargon (722-705) finds these Caspian peoples hard fighters. Sargon accords to *Kasipi* (possibly an ethnic and tribal designation; *Puranic Kasyapa*), the ruler of *Ellipi* (*Lullubi*), the title of king. Quite unlike Assyria, the towns have wooden walls, and buildings have wooden columns and roofs. The town of *Ushquya* had walls, 8 cubits thick. *Ulhu* on the foot of the *Kispal* hill had a canal as large as the Euphrates and a grove of old plane trees, the pride of its palace; the roof of the palace was of fragrant cypresses. 21 towns of *Sangibute* in the *Arzabiz* hills had walls 120 brick layers high, large gates with towers, wood work of cypresses, houses built artistically with gardens and vineyards. The town *Kissin* stood on a flat eminence and had three walls, besides a fortified suburb and some towerlike houses outside. It was destroyed by Sargon in 714. Quite a number of these towns are pictured among the sculptures in Sargon's palace at *Kharsabad*, now in the Louvre. The Caspians wear usually a short sleeved girdled tunic reaching to the knee over which there is a sheepskin coat which on peaceful occasions hang over both shoulders, open in front, but in battle serves for protection.

They fight usually with long spear and a rectangular wicker shield. They either go barefooted or wear high laced boots with upturned points. The hair is cut short, usually curled; and held in place by a red fillet, though often low caps with broad forehead bands are found; the short beard is also curled. The state of Kiasshin records the building of Musair temple by the the Urartian king Sanduri I, likely before 810. It is created on a high stylobate and has a front of six pillars on which there are votive shields in a profile as if hanging on a flat surface. Its door has a gable discharging the lintel. Over the columns stretches a large gable with a slope of $22\frac{1}{2}$, slightly steeper than the Greek gables. The tympanon is decorated with a network, indicating some ornamental design as on Phrygian (Briges-Bhrigus) rock tombs like that of king Midas. On the apex of the gable there is a large lance blade, the symbol of Khaldia, as an akroterion. Two votive lances, two large bronze basins and a few statues, one of an enraged bull, are in front of the temple. Russa I of Urartu rebuilt in 75 his capital Van—Topraqquale after its destruction by Tiglath Pileser. When Russa II built a new temple in 680—645, he brought many artists from Man (Mannacans; Bib. Minni; Egypt Menos; Cret. Menos; Pur. Manu; allied to Avestan Tor (valiant) or Turanians, Pur. Turvasu, Pales. Turbazu, both Mediterraneans). Only a few excavations have been made at Topraqquale. But the main features of Urartus are: rock cutting for fortification and substructure of buildings and technical purposes like aqueducts, tunnels, stairs; buildings with huge square stone masonry; the use of white and black stones in alternating layers as in Crete and among the Phrygians in Anatolia. Yannic bronzes also show roofs like of the Phrygian (Briges-Bhrigus) tombs. So it seems that Urartus (Ararats-Pur. Arāttas: Herodotus mentions that Artaxi was the old name of the Persian nobles in the form of Art which formed the prefix of large number of Persian nobles as Artabanus brother of Darius, Artabazus, the general of Xerxes. At the winter solstice, naked Urartian women danced nude, wandered in bands through fields and forests, shouting *Sabat*, killed a bull, buck or a man, feasted on it and had promiscuous sexual unions to awaken Sabazius. Urartians=Phrygians=Thracians. Varuna-Gk. Uranus-Urartian *varan*=covering,

tent. Vedic *aramati* = Avestan *armaiti* = Urartian *armitikā* = mother earth, cereals. Ved. *Av. Vāta* = U. A. *and* = air. Ved. *Av. Aryaman* = Teut. *Irmin* = U. A. *Armenak* = hero of Armenia. Armenian *Dikh* = Deus = Teut. *Tiu* = Gk. *Zeus* = Ved. *Dyan*. Avestan *spenta* = Lith. *svanta* = Gk. *spendo* = to pour libations; Skt. *svanta* = holy; Ar. *spandunis* = priest; *spandanoty* = slaughter house; Ar. *ardar* = Ir. *arta* = Ved. *rita*) were a Phrygian tribe. In the Avesta (*Yasna* 5, 45) Kavi Usa (Pur. Kavi Usanas, a Bhrigu) prays to Ardvī (there is Bhrigu called *Ura*) to become the highest sovereignty on Mt. Eresifyā (= eagle mount, Arzabla of Sargon stretching north of the Urmia lake). Bundahshn calls the fire of Agbatana Kavatakam, the founder of Kavi dynasty. Kavāt means colt. Daiankku (Deiocedes) are the Kavi of Avesta and Kayanids or Kekayos (Kekayas of the Punjab) of Pirdausi. In 715 Urartus entered Mannean land, and made Daiankkir its governor. Daiankku revolted and seized some fortresses. Sargon sent an expeditionary force, captured Daiankku with his family and deported them to Hamath in Syria. But even two years later, the region of Agbatana (Hamadam) was known as bit (place of) Agbatana (Hamadam) as bit (place of) Daiankku.

Tepti Huban-in-Shushinak was the ruler of Susa (653—652). His neighboring ruler of Elam Urtaki, also of Shushinak descent, an Elamite, made a diplomatic marriage into the Shushinak family. And jointly they marched into Babylonia, covering the land like a swarm of grasshoppers. And some neighboring tribes like Daitai (Av. *Daita*; Pur. *Daitya* = Mongoloids), Puhutu (Pushia, Pakta = Pathan), Deonu (Av. *Dan*, Rv. *Dānava*, Gk. *Danai*) and Kitan (*Kirāta* = a Tungus people), they declared, had already accepted their rule. But Urtaki suddenly died in 658. And Tepti Huban in Shushinak surrendered to Ashurbanipal's generals and Urtaki's nobles were beheaded, and he was recognized as the ruler of now united Elam. The sons of Huban (also Shushunaks), Aultash, Kuduru (Pur. *Kudru*) and Paru, together with the sons of Urtaki with numerous nobles fled to Ashurbanipal for protection. Ashurbanipal welcomed them with open arms. Though Ashurbanipal received the ambassadors of Tepti Huban-in-Shushinak, Huban Tatarah and Nabu Danik as pictured in the bas-reliefs as a fat old eunuch and a youthful official, he refused

their demand for the extradition of the fugitives. Tepti Huban in-Shushinak built a new temple of Shushinak at Susa and in a state he told that he had conquered the lands of Balahute and Lallarz, through the help of the deities - Sushinak, Huban, Pinikir and Kirisha. Thus intoxicated with the expectation of the divine favour, Tepti Huban in-Shushinak turned his thoughts again to conquest. But in 663 he was seized with epilepsy. Shushinaks however attacked Der. But one of the generals, Simburu deserted to the Assyrians. The king's nephew Urtaki was wounded by an arrow and begged decapitation from his Assyrian captors, while the eunuch Ituni, but recently ambassador at the Assyrian court, attempted to cut his own bowstring when he saw the battle turning against the Shushinaks, but he was beheaded. Tepti Huban and a son fled from the onslaught, but their chariot overturned and both were killed outright. The Ulia River was blocked with the dead and the dying, and dead bodies filled the plain of Susa. For 25 days Assyrian troop marched over Elam, scattering salt on ruined fortresses. The royal family, in particular, the females of the line through whom royalty descended, were transported to Assyria with many noble families and warriors. Wild Asses and gazelles were let loose. The temple of Shushinak, built of glazed brick with towers of shining bronze, was torn down. Shushinak and other gods such as Shumuda, Lagamar, Partikira, Udura, Sapak (possibly Kassite Shipak), Rajiba, Sungnare, Karsa, Kirsama, Kirisha, Shudanu, Ajapaksina, Belala, Silogara, Panjintimri, with their priests, worshipping altars and vessels were transported to receive worship in Assyria out of the proceeds of the dedicated properties. These splendid trophies of conquest were to accompany the ceremonial return of the statue of the goddess Nana of Uruk which Kadru Nahhunte brought victoriously about half a millennium before. Thus ended the splendid dynasty of Shushinaks.

Ashurbanipal also mentions that one Kurush (Karu), king of Parsawa, met the Assyrians near Hidalu, acknowledged Assyrian suzerainty; sent his eldest son Aruukku with presents to Nineveh in 609 B.C., as a hostage, frightened by the successes of Assyrians. Sennacherab mentions that in his 8th campaign that Parsawa, Ansame, Palus and Ellepi supported the Babylonian causes. It

shows that by 690 Parsa tribes did not occupy Anshan in the south, later known and identified with Parsa. Esarhaddon (681-66) mentions that Wamitarsi (Median Vahmyataresah—one who recites the right hymns) was the belali of the Medes. Vispati was Iranian clan leader, Zantu(jāti)-tribe)-pati-tribal chief; Dahyu (Dacians-Av. Daiiae)-pati—the ruler. Belali being singular, plural being bel-alinini, it indicates there was an Arya ruler and Arya conquest over Media, coming from Patiswara Demavand region where the Aryans advanced from Erān vej (Arya Nivisa), the land praised in Avesta, between Iaxartes (Av. *Daitya*, for the Mongoloid Daitus lived there; Pur. Sitā) and the Oxus (Av. Vakish; Pur. Akshu, following which Ikshvāku (=Achaean) Aryans reached Kailāsa region, and through Sarayu defile to Ayodhyā plains), the present Khwarizm Samarkand. Esarhaddon also mentions that a young chief of Kar-Kashahi Kasharite Kshathrita was organizing a coalition with Wamitarsi of Medes against Assyrians, and who had already conquered Kesirsin. Kshathrita seems to be a variation of which Darius and Xerxes call themselves, that is, Khatti by which name Hittites called themselves. Kshathrita attacked the cities of Kambite and Ushisho, and intercepted the Assyrian messengers sent to Media. He induced Median city chieftain Namitarsor and Dussani of Sapardo to join him to fight against Assyrians. With the Cimmerian and Scythian help he occupied the throne of Media. The chiefs—Uppis of Partakka, Zanaema of Partukka and Ramatua of Media—presented themselves to Nineveh and begged to be reinstated. But the Cimmerians (Assyrian Gimmirrai; Manda, Marunda, Kinnara) and Scythians, horse-borne and hard-riding, even penetrated into Eran and wrested from Esarhaddon, Dur Rulit and Shardia. Igubi Kshathrita (Phraoster, 616-603) died suddenly leaving his son Cyaxares (Uvashshatra=Hvakhshtra), but the Cimmerians and Scythians dominated Media for 28 years (608-580).

Kurush (Cyrus=Kuru) who acknowledged the suzerainty of Assyrian Asurbanipal and sent his son Arukku (Teispes=Chushpiab) was a Scythian=Sakkha Manish=Ir. Hakhamanish=Gk. Achaemenide. Kuru was an ethnical and tribal name. Perhaps the Kurus became mixed with Parsa tribes. It was simply the ruling family over the Parsas. By sending his son

Arruku (Teispes), Kurus occupied Ansum and called it Parsa, after the land and the people they came from. It was a migration southward of the Parsa (Frise=Parisii=Puru) people over the devastated Ansum. Teispes (Cheshpish) was conquered by Kshathrarita. But the Scythians again reinstated Teispes in Parsa (Ansum) and in Parswas, as he was of the same ethnic stock. Teispes had two sons—Kuru (690-600 and Ariaramnes (Arya ramana : 640-615). Kuru the ruler of the ancestral Parswas had become king of Ansum; and in 9th year, his younger brother Ariaramnes calls himself *king over Parsa, this here land Parsa*, in a foundation tablet, later brought to Agbatna. Cyaxares however became king of Media with the help of some Scythian chiefs and with the Scythian strong bowmen deprived Ariaramnes of his Parsa kingdom and his title of *king of kings*. On a silver tablet Ariaramnes had boasted that Ahuramazda had given him the land of Parsa which possessed good horses and virile men as his father Teispes before him had been a king. But his son Arsames (Arshama) and his son Vishtaspe, father of Darius (Duraya Vahu Mana : 521-486) were deprived of the title of kings. Cyaxares strengthened his position by betrothing the infant daughter of his son Astyages to Nobopolarsan's young son Nebuchadnessar of Babylonia, on the understanding that both the forces are to act as one unit. Cyaxares is called Unman-Manda—host of the Manda (Cimmerians; from Manda, the land has been called Mada, Media; Pur. Madra. The Achaemenides called Egypt also *Mudraya*). In 612 both Cyaxares and Nabopolassar attacked Nineveh. A new kingdom was formed in Northern Mesopotamia, and Cyaxares returned with his spoils of victory. Now Cyaxares' kingdom extended south of Teheran in the east, Ispahan in the south, Atropatane and Azerbaijan in north-west, with Ecbatane (modern Hamadan) as his capital. Cyaxares had already conquered Parsa and now he brought Parswa under his domination, and gave both these lands for administration to a Kambojiya chief (a Saka tribe allied to the Kurus : 600-559 : Pur. Kamboja), who was married with Mandane, a daughter of Astyages; of this union Kuru (559-529), the founder of the Persian Empire, was born. Cyaxares extended his boundary up to Haly's River in 590 B. C., and a treaty of peace settlement was concluded with Alyattes, the ruler of Lydia

by which he ceded all territories up to the Halya, and his daughter Aryenis became the wife of Astyages. Only Cadusians (Kurds - Guti - Par. Gādhi - Amorite - Mitanni - Mithili) living in the narrow region between the Elburj Range and shores of the Caspian Sea did not acknowledge Median authority.

Within a year Astyages (Ishtavegu : 585-550) succeeded his father ; while Nebuchadnezzar (604-562) was on the Babylonian throne who built the hanging gardens of Babylon to please his Median consort, the daughter of Astyages. But the successors of Nebuchadnezzar changed his policy. They became afraid of the Median power. Cyrus, son of Mandane, daughter of Astyages, and his Anshan governor Kambajia chief became ambitious, if not to usurp his grandfather's throne. He began to fortify Pasargade with the legend, the great king. Babylonian ruler Nabonaid made a secret understanding with Kuru. And as allies they captured Harran which was Median garrison town. Astyages summoned Cyrus to his court in 553. But Cyrus refused to go. Harpogus, the Scythian commander of Astyages with his army deserted to Cyrus, and Astyages and some Median nobles were taken as prisoners by Cyrus. Cyrus at once proceeded to Ecbatana and looted its treasure. There are seven royal tombs at Nagsh in Rrestan and Persepolis which show that early Achaemenides were buried. Darius and his immediate ~~successors~~ alone invoked Ahura Mazda. It was Darius's father Vishtaspa, governor of Bactria, who patronized Zarathustra, and his reformation. And when Darius killing of pretender Smerdis (522-521) became the emperor, he made Zarathustra's reformed tenets state religion. Not even in Behistana (Bagastana) he mentions Baga or Mithra. His son Xerxes (Kshayushah - who rules through right) and his successor Artaxerxes - Rita Kshathra - who rules through Ritham) invokes Ahura Mazda alone. While Artaxerxes II and III lost their zeal, and reverted back to their ancestral gods, invoked Mithra and Anahita together with Ahura Mazda, and Artaxerxes II put up statues of Anahita in all capital towns of the empire. Darius and Xerxes called themselves Kshatiya) - Skt. Kshatriya ; Pali Khattiya) that is the Khattis. The Persian soldiers depicted in glazed bricks are Alpines with nose bridge in one straight line with the forehead like the Khattis. Alexander married after the overthrow of the Achaemenides (Persas

dominated by Saka Kuru rulers—mixed Alpines) Oxyartes (Su (hu) Khatra—good Khatti or ruler) daughter Roxana—O. P. Raskshana—Pers. Rosan—Skt. Rasmi—rays of light. Khattis used to speak mixed Aryan speech of centum variety. One thousand Persian women of noble families acted as body guards of the Achaemenide rulers, having on the butts of their spears golden apples of whom 800 watched them at night (Athenaeus 18, 5, 14). The female body guards of the Mauryas originated from this Achaemenide custom. Parthavas (Parthians; Pahlavis; Pallavas; Villaves of India) belonged to a Saka tribe of the southeast of the Caspian Sea. They came under the domination of the Greeks. When Macedonian Seleucids defeated the Greek Demetrius of Bactria, the Bactrian Greeks with the help of the Parthians drove out the Seleucids. In the mutual slaughters both the Seleucid and Indo-Bactrian Greek powers were shattered. It enabled Parthian Mithradates to conquer Media in 150 (Arjuna is called a Parthava. It is very likely that Saka Kuru was an offshoot of the Parthava tribe) whose kingdom extended from the Indus to the Choaspes, the river of Susa. But the the irruptions of the Sakas in 100 B.C. caused great racial movements. Sakas were settled by Mithradates II (128-87) near the border of Afghanistan, which after their settlement is called Sakastan, later abbreviated into Seistan. This territory was governed by the Suren Pahlavas. There was another Saka clan Kephesates or Kohzadah which is found in the ruins of Kuh i khwa sa—Lord, represented by the Khojas of Bombay. But when Sakas began to assert their independence, Surens opposed it, and one of their scions Gundophares became the founder of Kandahar, and united under his domination Iran and northern India up to the Indus. Gundophares ascended the throne in 19 A.D. and assumed the title of Mithradates II, the *great king of kings*, overthrowing the suzerainty of the Arsacids and was ruling in 55 when he wanted to put Orthagnes, an Arsacid on the Iranian throne. Arsaces (250 B. C.) was the chief of Parni (Parna Rv. 1, 53, 8) Parthavas. Marriages between brother and sister, even son and mother, occurred among them. Parthavas became known as *Pahlavas*. Parthavas in S. India were called *Pallavas*. From Ausch (= Arsaces—Parthar) a Parthian prince

translated 278 Buddhist books in Chinese of which 55 still exist. Parthian Vologes I (Valkhash) had to fight the Roman army for the throne of Armenia. Vologes had appointed his brother Tiridates (Tirdad) on the Armenian throne which Nero (55-68 A. D.) opposed. But Vardanes, son of Vologes, revolted against his father, Vologes did not move. But after 3 years when his son's rebellion was subdued, Tiridates was placed on the Armenian throne. But Tiridates was defeated by the Roman army. Peace however was concluded, and Tiridates was to receive the crown of Armenia from the hands of Nero in Rome. But Tiridates had religious prejudices to go to Rome by sea; he went to Rome in 86 A. D. by land route with an escort of 3000 horsemen. Tiridates was received with honour. And he stayed about nine months in Rome, and it cost the Romans about Rs. 75,000 a day. Vologes died in 77 A. D. and was succeeded by his brother Osdroes or Corroes. He ruled from 100-129. Upon the death of his brother Tiridates in 100, Pecosus placed on the throne his son Assidares. Emperor Trajan resented this. To win over Trajan Osraces sent an embassy to Rome with rich presents and with message, that as Assidares was not liked in Rome, his appointment is recalled; and if Trajan will consent to it, he will appoint Parthamasiris, the only son of his friend and ally Daosbalus, the famous king of the Dacians (Ir. Dahae = Dāsae). Trajan declined the gifts and replied that on reaching Syria he will make his decision. On reaching Antioch Trajan had a letter from Parthamasiris as king of Armenia. Parthamasiris wrote again a submissive letter. Trajan replied that he must receive the crown of Armenia from his hands. When Trajan went to Armenia in the spring of 115 Parthamasiris placed his crown at the feet of Trajan. But Trajan instead of placing the crown on his head, had him pursued and murdered. Already in 114 near Susa, a Roman troop made a prisoner of Corroes's own daughter who was sent to Rome as a hostage. Trajan died in 117. His successor Hadrian released Corroes's daughter in 130 and a peace was concluded with the Parthians. Assidares—at the unfortunate turn of events become a Buddhist monk, came to India to study Buddhism and went to China to preach it. Kushans (Chou or Kou = Kao-shim = Chuo-shim = Yuchuan) occupied Bactria about 60 A.D., and then passed

to Afghanistan and N. India. Though the great Kushan monarch Kanishka became a devout Buddhist, his coins bear images of Iranian divinities such as Mithro (Mithras), *mañ* (the moon), Athro (fire), Orthagno (Varasthregne=Indra), Pharro (Havarno=Parna), Teiro (Tir=Tishtra), Nanaia (Nana - Rv. 9, 112, 8), the mother goddess of Urak. When Ardashir (Skt. urdha-shira=high head), the founder of the Sassanian dynasty built Firuzabad under the name of Ardashir khurra (Ardashir's Majesty), as Cyrus had built Passagarde, his Parthian overlord wrote him a letter ; "You miserable Kurd (Gati=Par. Gādhī), how dare you build such a royal residence." The last of Ardashir and his brother Shapur's coins before his sovereignty bear on the reverse the head of their father Pāpek in continuance of the coin devices of Mithradates II. Ardashir's victory over the last of the Parthians is a picture on a rock near Firouzabad. Here Ardashir is depicted as a strongly built tall dolichocephalic with very prominent aquiline nose, the roundish helmet, kept in place by a broad flowing fillet on the forehead, the body is armoured on which there is a crest and coat of arms. He rides on a horse which is also armoured. Not far from, the captured Roman emperor Valerian kneels before Ardashir's son Shapur who is also like his father in physical features. At Persepolis, a graffiti of Shapur, the elder brother of Ardashir who ruled only for 3 months and is said to have been killed at Persepolis by a falling stone ; here Shapur is pictured as a very tall, wearing a roundish cap, tightened by a flowing fillet, at the back, dolichocephalic head, with prominent eagle nose, flowing beard, wearing a coat, tightened in the waist by a waist band, chequered bulky pajamas and shoes. Ardashir patronized Zoroastrianism as a state policy. He had the Arsacoidian text, written in Arsanidian script. Volugases I transcribed it into Sassanian script together with a redaction of the contents which were but fragmentary. Shapur added translations from Greek, Syriac and Indian sources. Shapur II ordered the invention of a special script, called Avestic, for these books written in a dead dialect, understood by very few, as a fixed valid canon of the Zoroastrian religion, and interdicted any other text or doctrine. But shapur I was not a fanatic. He received Mani,

recommended by his brother Peroz, on his coronation day, and accepted from him the dedication of his Shahpuhrkân book. His brother Peroz, governor of Bactria, patronized Mani, Vishtaspa showed favors to Zarathustra, but in his coins Shapur represented himself in adoration before *Buddha the God*.

Afghanistan (Gandhara) is chiefly peopled by Caspians and Alpines. The Caspian traits — very tall stature, prominent aquiline nose, long head with broad face, strong muscular development, green, grey or hazel eyes are the dominant features of the people — among the Durani (Druse — Durhya; Dru-jaska, Vendid 19,14) and Puktun (Rv.7,18,7 Paktha — Pathan). Though Tajiks (Rv. 6,26, 4 Tuji — Tokhari = Fur. Tukshaka nāgas) were originally Tocharian Aryans with long head, blue eyes and golden hair as found among some in the Oxus region and in Tadjik Soviet where there are about 1½ Tajiks, but in Iran, Afghanistan and Central Asia they are generally mixed with the broad-headed Alpines. Alpine infiltration through the Hunnish and Turkish conquests — evident everywhere. Even the Pathan shows mesocephalic tendency. The Ghilzai claims to be of Turkish origin. The Maneans (Manu), Tur (Turvasu) of Iran and Brahui of Afghan-Baluchistan border are the Mediterraneans. The Panis (Vedic-Pani; Punics, Phoenicians — Vanikas), Darads (Daradas), Uzbegs (Vāsukināgas — Wosun), Turks (Tarksha) are Alpines. Hazaras are Mongoloids, slightly blended with the Alpines. Green-eyed tall fair-complexioned Kafirs are remnants of the Caspian Wosun (Vāsukināga — Usuivis — Syrian Wassugganni) incursions, speaking Kewar dialect, an intermediate between the Avestan and Sanskrit. Gadaros of Makran after whom S. Baluchistan was called Gadarosia (Gāndhāra) — the Susinag Kudurus (Pur. Kudru), slightly mixed with the Caspian Darzadas (Durhyas). Afghanistan was incorporated into the Achaemenide empire. The Macedonians who were mostly Caspians brought with them the Aryan Ionian, Alpine Dorian, and mixed Mediterranean and Alpine factors from Asia Minor. Seleucus (Selucid — Chālukya — Salanki — Suliki) Nicator surrendered Kabul valley to Maurya (Caspian Moor) Chandragupta. Then it fell under the Indo-Bactrian Greeks. Parthians (Pārthavas; Pahlavas) wrested it from their hands. Sakas

settled in Seistan (Sakastan). In the first century B. C. Yuechi (Yaksha) Kushans from the Oxus (Aksu-Iran. Vakhsh) region occupied it. Yuechis lost their conquests to Kidars-Kitans-Kirāts. Then came the Huns and Turks.

13.—INDO-CHINESE RELATION

Pithecanthropus erectus with peculiar thickening of the jaw bones and conformation of the teeth, characteristics of the **Mongoloids**, has been found in Pleistocene beds of nearly half a million years old, in Choukartean cave, some 80 miles southwest of Peiping with crude paleolithic implements. The upper front teeth and canines are shovel-shaped, a Mongoloid characteristic, found among the Mongols, Eskimo, Chinese and Japanese. Not far from it some paleolithic skeletons have been found in 1983-34 of Caspian type. Paleolithic animals include woolly rhinoceros, elephants (*Elephas nomadensis*), wild ass, *Bos primigenius* and gazella whose remains have been found. Neolithic sites abound from Kansu in the northwest to Shantung in the northeast. Men hunted and fished, raised millet and ground it on mealing stones, raised pigs and dogs for meat. For hunting they had stone knives, axes, bows and arrows, and sewed bark clothes with bone needles. They had li-tripod pottery in northeastern region and painted pottery in northern region and painted pottery in north-western Honan. Yang Shao painted pottery has a family likeness to that of tripolje in S. W. Russia as well as with the pottery of Susa, Jamdel Nazar, Anau in western Turkestan and Baluchistan. A silk cocoon has been unearthed in neolithic remains. Dog and pig were the most important food animals of paleolithic China. Millet was also grown. It is said that Huang-ti (Hsiung-nu, Huangnu-Huns-Sesa nāga-Siau or Sushināga), the yellow emperor, is the founder of Hsia dynasty. He is likely to be Alpine. It is said that his wife Siling about 2640 B. C. encouraged sericulture. Hsia (Hsiung Nu) dynasty according

to traditions ruled for 491 years under seven kings. Alpine brachycephalic leptorrhine factors are still dominant in Kiangsu (cephalic index 85.14; nasal index 70.21; stature 1666) where they were forced to migrate due to the incursions of later conquering hordes from Shansi. Their domination did not extend more than 2 or 3 adjoining provinces. They were overthrown by Tang (Tunganses = Pur. Tunga), a dolichocephalic leptorrhine mixed Caspian horde, allied to Manchus, Kitans of the Illu valley (known as Kitai, Keraites in Eastern Europe, Kirātas in Purānas, from whom China has been called Cathay as they settled in western and northern parts of China, from which regions they were driven by Nuchen or Kin (Kauva dynasty of India) who occupied northern provinces from the Sung (Sungas of India). It is known as Shang dynasty who ruled in Shensi up to 11th century B. C. According to tradition supported by archeology, the Shang ruler Pan Keng moved his people to Anyang where he built a city on the bend of the Huan river, a tributary of Hoangho in Shansi. Their houses were beehive-shaped pits dug in loess by tunnelling horizontally which stand vertically without falling, roofed over with timbers and these were covered with beaten earth or thatch. Entrance was through a door in the top. Such a dwelling is still found in that region. Shang knew not the use of bricks. Anyang was surrounded by a mud wall, 2 feet thick and 12 feet high, made of pounded beaten earth, and a board frame was used to hold the beaten earth on the sides. The foundation of a surface building, possibly a palace or assembly hall, 26 feet wide and 92 feet long with many pillar bases has been also unearthed. The bones of the following animals are among the Anyang finds: dogs (2 kinds), bear (2 kinds), badger, tiger, panther, whale, rats, hare, tapir, horse, pigs (2 kinds), deer (2 kinds), sheep, goat, ox, water buffalo, elephant, monkey and chicken. Of these dog, pig, sheep, goat, ox, water-buffalo, monkey and horse were domesticated. Horse was used for drawing war chariots; carts of heavy loads were hauled by oxen and water-buffaloes. Of domesticated animals the following were used for food: cattle, pig, sheep, dog and chicken. Beef was the most important article of diet. Next to it was pork. But the pig of neolithic China was *Sus scrofa*, a northern variety, while at

Anyang, it was a southern specialized breed—*Sus vittatus*. Millet was cultivated as in the oracle bone inscriptions there are questions like this: "Will there be rain enough for the millet crop?" Beer was brewed out of the millet. On bone inscriptions the pictographic representations of upland and water-rice are found. But whether they were cultivated by the Shang or imported by them for uses are not known. Fibres of hemp and silk clothing and matting used to wrap up bronze knives and vessels impregnated with preservative copper sulphate have been found. A silk cocoon has been excavated in paleolithic China. The character for silk is also indicated by Shang oracle bones, but not entirely certain. Only in early Chou period silk worms are carved out of jade and found mentioned in the literature. And inscription of bronze vessel of 9th century B. C. records the use of silk as a medium of exchange in a transaction involving the purchase of five slaves. Sewing was common as attested by bone needles in the neolithic sites; and bone and bronze needles at Anyang. Spinning whorls, both of stone and pottery, quite like those used in China to-day, have been found in neolithic China; and even 20 globular buttons of marble (diameter 4.5-14 mm) have been found in neolithic China, indicating that silk garment or fine hempen dress was used. Representations on the Shang oracle bones show that tailored clothing with sleeves, made of hemp or fur, were used; stone rings, one of flame green jade 65 mm in diameter, have been found in neolithic sites as used at Anyang. Numerous bone hair pins have been found. In Chou period men also used hair pins to keep their ceremonial hats in position. Horns of cattle and bones of deer were used to make weapons and utensils. Tusks of boar and elephant, conch and molluscan shells were used to make a variety of things. A barrel-shaped musical instrument carved out of bone, known as *Lusuan* (Chinese Ocarina, said to have been invented in 2,000 B. C.), about 2½ inches high with a hole at the top to blow into and holes on the sides which may be stopped with fingers to vary the pitch, has been found in a Shang tomb. Much of the Shang pottery in early period was made by hand, the surface being smoothed off afterwards, either with hand, or by scrapping with tools. Potter's wheel was also used. Some of the pottery was

glazed. The glazed pots are brown in colour with light gray freckles in the glaze, commonly decorated with parallel wavy lines. Oracle bones show that in Shang as well as in Chou times, matting was spread on the floors of dwellings. Among the Shang's younger brother inherited elder brother's property, and not his son. Children knew their mother, but not their father. Several fathers are sometimes mentioned indicating several men were married to one or more women. Polygamy was sometimes practised. Oracle bones tell us that one king had 3 wives, 3 kings had 3 wives, but 2 kings had only one wife each. The position of queens was high as queens were sacrificed to independently as well as in company with their husbands. Slaves were taken and tattooed on the forehead to distinguish them from the freedmen. Female slaves were called *Chieh*, meaning concubine, indicating that their masters exercised sexual rights over them if they liked. Bow was the chief offensive arm of the Shang. It is the reflex or Tartar bow in the shape, known as cupid's bow, made of flexible wood, combined with horn and sinew. The shaft was feathered at the rear end. The arrow heads were of bronze or carved out of bone. Battle axes and dagger axes were of bronze. Heads of spears and lances were made of bones or bronze. Seventy bronze helmets have been found. Chariots were used but not known how. Chou chariots carried three men, the driver, lancer and an archer. Chariots were also used mainly for carrying the commander or the king with flag and drum to give signals to advance or to retreat. These commanding chariots were naturally the focal points of battle. Cowry and tortoise shells were the currency of the Shang. Their inscription of bones coloured red with cinnabar or black with soot are not primitive picture writing. For practically all the present Chinese characters can be traced to them and their formation. Their chief god was King Heaven (Ti). King Wind was the envoy of Ti. Queen Earth-Mother. Earth is another deity. Dragon woman (Dragon) is another. The dead were buried. Forty of the skeletons have been found lying face downwards, extended prone. Bronze battle axes, dagger axes, vessels, white pottery vessels, bronze helmets, wrapped up in mats and then in hemp clothes have been found in royal graves. 88 bones decorated with bridges have been found buried in one royal grave.

Chiangs were also sacrificed. Chiangs of were *platyrrhine dolichocephala*. They are still found in Tibeto-Burman border, possibly of Monkhmer descents, and they were taken as slaves. Animals were sacrificed to the dead and to the gods. The thought that dead being only spirits as their material bodies remained in the graves needed food, but only took the spirit of the food like themselves, leaving the rest of the viands and of the drinks to be partaken by their priests and descendants, thus dining with the gods and the ancestors. Sometimes the sacrifice by burning was favoured as in the form of smoke and savours the spirit of sacrificed animals reached the gods and ancestors. The sacrificed animals included cattle, sheep, pigs and dogs, generally killed through shooting by arrows. Sometimes boars were sacrificed. One sacrifice consisted of 2 pigs, 3 sheep and 5 oxen. Another of 50 dogs, 50 sheep and of 50 pigs. One offering to a former king included 100 cups of liquor, 100 sheep and 800 (cattle). Shansi people are generally of tall stature. Fifty p. c. of the population are *dolichocephala* and the entire population has *leptorrhine* nose. This indicates that the population chiefly consists of Alpines, Caspians or Yuechis (Tocharian Aryans or Fokhsas). A Yuchu (Yuechi) tribe reached the Wei basin of Shansi. The chief married the daughter of Hain (Hsiangnan) chief. And he was known as Yu Chou Hain (Yuechi Kusan, known in India). Yu Chou Hsien were overthrown by Chu (Yuechi). There was also Tungus tribe known as Hsiyen-Hsien-Kusan. Chu (Yuechi) were Tocharian Aryans. The bronze socketed celt, one of the characteristic implements of the late bronze age of central and eastern Europe, occurs in China in considerable numbers of early Chou period. The bronze socketed celt is found all over Eastern Europe, in the Siberian barial mounds (Khurgan), in N. Burma and Cambodia, but not in Asia Minor, Egypt, Babylonia, Iran and India. It indicates that the socketed celt reached N. China, N. Burma and Cambodia across Siberia. The Chus ruled majority of the northern provinces, including Szechuan, Hupei, Honan and Chekiang. The Chus introduced feudal systems. They distributed the conquering territories among their allies, commanders, chiefs and relatives. A part of Honan was given to Sung (Sunga dynasty of India) brother of overthrown Shang ruler.

for the help he rendered, and it was called Sung after his name. The Chous ruled the major parts of China from 1122-256 B. C. a very glorious period of Chinese long history, when the *hundred schools* of philosophy rose. Apportioning of lands to various chiefs and nobles resulted in feudal systems. Among the Chous the eldest son of the chief queen inherited the property, while among the Shang, the younger brother of the deceased king. The chiefs and nobles were given lands they could conquer, and they thus placed permanent garrisons of troops in all the strategic positions of conquered territories. These feudal lords ruled their subjects as they pleased. The king only saw that his vassal chiefs paid some tributes to him, showed him allegiance and they did not become too powerful to menace his position. But the nobles in a couple of centuries began to feel jealous of each other, and enlarged their estates at the expense of their neighbors. T'ien Tzu, the son of heaven of Chu, was the official title of the Chu kings. He alone bore the royal name—*Wang*. His vassals, the feudal lords, owed him tribute and homage. He alone invested a new feudal lord with power and authority. Yu, the Chu king, became infatuated with a pretty girl Pao Szu, and made her his queen when she bore him a son, setting aside the heir apparent, his son borne by his rightful queen, the daughter of the chief of Shen. When the queen protested, she was sent back to her father with her son. It made the Shen chief furious. He in alliance with a few other chiefs and a frontier tribe attacked Yu, killed him, and Pao Szu was made a prisoner. The royal house was looted. The feudal lords set up the former heir apparent Ping as the rightful heir of king Yu. And the capital was moved to Loyang in 771 B. C. From this time Chou kings were but mere puppets in the hands of their nominal vassals. As the royal power declined, supremacy over the Chu territories passed to Chi (825-818), Sung (600-637), Tsin (636-628), Chin (659-621) and Chu (613-591). In early Chu period, the title of *Kung* (Duke) was restricted to the feudal lords, connected only with the royal family as Lu, Chan, Cheng, Chi, Yen and Sung. But later the new feudal lords assumed any title they pleased until in 325 B. C., all the important rulers assumed the royal title itself. But the old kingdom by their insensate folly to win supremacy by weakening their rivals gradually sunk into decay. Sung in

order to win a dominant position in southeast made a vain effort, but was conquered by Chi in 288 B.C. After the elimination of Sung, the struggle for supremacy was only among the six kingdoms—Chin, Chu, Chi, and three Tsins—Han, Wei and Chao. Chin in order to dominate became provocative and aggressive. In 299 Chu lord was invited for a conference. He was treacherously seized, and kept a prisoner until his death. One by one Chin absorbed its neighbors. And in 256 the royal house of Chou was seized and the son of heaven was forced to discontinue to make his royal sacrifices. The Chin king absorbed one by one the remaining mutually antagonistic and divided feudal states—Han in 230, Chao in 228, Chi in 226, Wei in 225, Chu in 223 and Yen in 221 B. C. In 221 B. C. the Chin king assumed the title of the First Emperor (Shi Huangti). He abolished feudalism. To destroy the power of landed aristocracy he caused 120,000 noble families, collected from all parts of China, to be deported to Shensi. He enforced the code of Chin all over the empire, abolishing different state laws. As the varying standards of weights and measures in different states hindered the imperial commerce and collection of taxes, the Chin weight and measures became the imperial standard. He abolished the provincial scripts, and Chin script became the imperial script. All weapons of War, not required by the armies of Chin were collected, transported to the capital and melted. Roads were built all over the country to facilitate rapid movements of the army to suppress any rebellion of the discontented elements. To protect the empire against the aggression of the nomads, he built the Great Wall. But as the influential aristocracy of scholars (Chun Tzu) began to protest against the undemocratic centralized Government as against their traditions, he ordered all the books which did not deal with medicine, agriculture and arboriculture to be burnt. His aim was to unify the empire in every possible way and to ruthlessly wipe out all the traces of distinctions. And he succeeded. **China** became one State. It had uniform laws, weights, coin, and script. It distributed lands to the peoples. It made the country democratic, abolishing all differences. After this great Chin king and empire, the whole kingdom became known as China to the outside world. But by burning books, the flames of revolt spread all

over the country and engulfed the royal house after death had removed the powerful personality of the emperor in 210 B. C.

In early Chou society woman lived in seclusion of home and marriage was the only career open to her. But wife had her part in sacrifices like that of her husband. When an envoy brought presents to a ruler, he also took appropriate gifts for his consort. Sometimes wife for barrenness was divorced, and she returned to the home of her parents. Father had absolute right over his children and wife. But she was protected by the position of her parents and brothers. Next to father, mother's authority was supreme. In early Chou period cowery shells were used as among the Shangs. Hunting and war were the principal sports of the Chous. In eating early Chous used to sit on mats. Their food consisted of wheat, rice, millet porridge, boiled hemp, seed; beef, mutton and pork broths; with vegetables; boiled, sliced or minced beef; roasted pork; broiled or sliced mutton; dog's flesh; dried meat; venison hash; turtle; carp; sturgeon; mudfish; mustard; pickled leeks; salt; peach; plum; pomelo; orange; jujube fruits; melons, raw or pickled; wild grape. Among the early Chous, drinking of liquor was limited to sacrifices. But Shangs were fond of drinking and feasting. The ancestral spirits She Chi were sacrificed to. But there were no priests, Heaven (Tien) was worshipped, and the king was called the Son of Heaven (Tien Tzu = Kusan Devaputra) who alone was entitled to make sacrifices to heaven.

Er Shih Huang Ti succeeded his father Shih Huang Ti, the First Emperor. But he lacked his father's organizing and administrative capacity. His army revolted. The army generals thought of dividing the empire among themselves. When the revolt was over a peasant rebel of Han (possibly of Huna tribe) found himself the master of the whole empire. Lu Pang adopted a conciliatory policy towards land-holding nobles and educated classes. The dynasty he founded is known as Han Dynasty. But the aggressions of Hsiungnu against whom the Great Wall of China was built strained the financial resources of the Early Huns. But as they suppressed many revolutions, so they drove away the formidable Huangnu (Huns) who consolidated their organization in 3rd century B. C., and who lived chiefly on meat and milk. Once the fighting power of Hsiungnu was broken, Han

empire and trade expanded in all directions. From Hsiungnu prisoners it was learnt that Yueh Chi, being defeated by them in 165 B. C., were migrating westward. In 138 B. C., Han emperor sent Chang Chien with 100 followers to induce Yuechis to renew war against Hsiungnu with Han support. But Chang Chien was captured by Hsiungnu and made a prisoner. However after 10 years when vigilance was relaxed, Chang Chien escaped towards the west with his followers and his Hsiungnu wife to find out the Yuechi. When he had reached Ili valley he learnt that Wu Suns (leptorrhinean dolichosephals with green eyes = Vāsuki Nāga) were occupying the valley, dispossessing the Yuechis who were now occupying the land between Jaxartes and Syr Daria. Chang Chien lived among the Yuechis for about a year, and failing to induce them to return, he started back for his country. But he was captured again by Hsiungnu. But as a revolution broke out among the Hsiungnu he escaped and reached China only with his wife and one single survivor of his 100 followers. Chang Chien brought valuable geographical information with him. In Ta Hsia (Bactria) he saw cotton cloth from Shentu (Sindh). But as connection with India to secure Indian cotton was difficult, Hans captured Qanton area (Nan Yueh) to reach India. But by numerous attempts, the Hans found it more difficult and dangerous than Bactrian route. Chang Chien was again sent to the west this time to Wu Suns in Ili valley to induce them to fight against Hsiungnu, their hereditary foes. But Wu Suns refused to renew fight against such a powerful enemy. However they granted passage to the Chinese Sogdiana (Ta Yuan), Bactria (Ta Hsia). The Chinese sent embassies through this route to Parthia (An Hsi) and India (Shen Ta). But nothing further is known about them. Chang Chien introduced into China the cultivated grape and alfalfa. But a Chinese envoy who took by force some horses in Sogdiana was killed. Emperor Chu sent an expedition in 104 B. C., to avenge this murder. Lung li with 30,000 Chinese soldiers after defeating the army and capturing towns after town laid siege to Er Shih, capital of To Yuan. The nobles of Er Shih killing their king opened negotiations of peace with the Chinese. 300 horses and provisions for the army were given, and the Chinese agreed not to enter into the city and to return to China. The new king

sent his son to Han court as a hostage and frequent embassies passed between China and Ta Yunnan, Kashgar, Khotan, Turfan, whose chiefs who were mostly Yuebis or Iranians, against the rising of power of Hsiungnu (Huns - Turks) became tributary to China. The Hans strove to capture the important trade route with the west through Hami, Aksu, Kashgar, Turfan and Khotan. At that four powers strove for supremacy and converging on central Asia. Kushans (Yuechi = Yu Chu Hsen - Chou-shin - Kushin - Kaoshin - Tocharian Aryans) ruling Afghanistan, Northern India. Hellenized Parthians (Saka Parthavay) ruling Persia, Oxus basin and parts of Central Asia. Roman empire, not only the mistress of the Mediterranean regions, but contesting for supremacy with the Parthian empire in Armenia and for trade routes to China for her silk. This eastern part of the Roman Empire was known as Ta Chin, because it adjoined the Chinese empire of the Hans. Merchants from Ta Chin reached Loyang in 166 A. D., and claimed to be an embassy from Marcus Aurelius Antonius. The merchandise exchanged between the Roman and Chinese empires were generally of light weight, small bulk and high value. Romans wanted silk, either as threads or woven and dyed clothes. The Chinese also claim to have exported, in addition to silk, iron, skins, furs, rhubarb and cinnamon. The Middle kingdom imported in return glass, jade, horses, diamond, ivory, tortoise shell, asbestos, fine linen and woolen fabrics. At Lou Lan, a deserted ruin in the Lop Nor region of Turkestan, owing to the failure of wells, where a Han garrison was stationed across the desert to Kashgar and Parthia, polychrome figured silken garments and hangings, showing refined and intricate patterns of early Han art have been found; similar silk materials have been found in a ruined watch tower outside the frontier fortress of Tun Huang in the extreme north-west of Kansu. The designs are generally dragon and phoenix, animal style ornamentation with confronted beasts and of birds. Similar designs have been found at Lak Lang, a military colony in the heart of Korea, founded by Han emperor Wu in 104 B. C. The Lak Lang finds include a polychrome lacquer bowl of 85 B. C., and a gold belt buckle set with stone inlay in an intricate pattern of entwined dragons. Paper was manufactured in 105 A. D., from the mixture of mulberry tree bark, hemp and rag.

Changan centralized metallic minting, but it did not check violent fluctuation of prices. He (20-320 A. D.) therefore killed his white stag and made a kind of treasury note out of its skin, and each piece was assigned the arbitrary value of 400,000 copper coins. Thus paper currency after skin currency was established. The Hans being of middle class origin, rising to power only by personal valour and clear thinking, were not bound by any traditional prejudices. They favoured new ideas, new thoughts and new contacts in the pride and glory of their own achievements. Hearing of Buddhism from his central envoys, the Han emperor Han Ming Ti sent an embassy to India to bring some Buddhist monks and literature in 61 A. D. The embassy returned to Loyang in 86 A. D., with the image of Buddha, and some books and two monks—Kāśyapa Mātanga and Dharmaratna. The Buddha image, the books and the two monks were placed in *White Horse Monastery* (Pai Ma San) which still exists, outside to Loyang, named so, as the precious gifts of Buddha image and the Sacred Books were brought to China on a white horse. Kāśyapa Mātanga (Kāsyah Motang) translated into Chinese the Sūtra of 42 sections. The book was retranslated into better Chinese in the middle of the third century A. D., by Chekieu. "Good conduct according to Dharma requires that ten rules should be observed. Every committed fault which man approves of and does not condemn becomes a sin which is carried to his debt. Multiplied sins are added, one to the other, as drops of water in the ocean. Whoever would advance must wipe out his sins day by day by good actions. One must consider that the wrong doer is ignorant, not malevolent, and do good to him. The great law is universal love, compassion for all, always trying to do good to others and to be content with these actions. Thus one shares the merits of others." Dharmaratna (Chufatan) translated 5 books which are lost. Hans favoured Buddhism. The dynasty nominally lasted upto 221 A. D. when the last Han ruler was forced to abdicate his throne in favour of his Tartar Hsiungnu general Tsao Tsao's son Tsao-pi. Thus the Han empire split up into three sections. Northern part was occupied by Hsiungnu Tartars, known as Wei kingdom with Loyang as capital; southern as Wei by the Sung (Sunga—Tsung—Tungas) family, with the capital at Nanking; and Shu Han (Szechan),

founded Lile Pei, a distant scion of the Han family with Chang Tu as capital. Tsao's notorious epigram was: "I would rather betray the whole world than let the world betray me." One of the famous generals of this period Kuan Yu (Yuchi) has been canonized as a god of war who prevents fighting by amicable settlement. In 265 A. D. Sesuma Yen, the hereditary Wei general usurped the throne as Tsun Pi and ascended the Han throne. The dynasty—Tsin—reunited the whole empire for a brief period. Sunayen had 25 sons among whom he divided his empire. Civil war broke out among the brothers. In 304 one brother brought in Hsiungnu tribes to his assistance. Another brother asked for the assistance of another allied tribe Hsien Pei. Hsiungnu chief Liu Yan related to a Han princess by his mother's side defeated the Tsin brothers who divided among themselves could not offer any effective resistance. In 311 he won Shansi kingdom as his rewards; but he sacked and captured Loyang and made the Tsin emperor his prisoner. In the sacking of Loyang the famous Imperial Library of the Hans was burnt. A Tsin successor took refuge at Changan. In order to get at Tsun, Chang An was completely destroyed. The Tsins escaped to Wu state where they ruled south of Yangtze up to 420 A. D. Tartar rulers favoured Buddhism, as they suspected Confucian scholars of disloyalty, and majority of them fled south. Buddhist, Parthian, Kushan and N. Indian monks also could reach N. China safely through territories of Hsiungnu influence and through their regular trade routes. Tartars therefore in order to get efficient loyal subordinate officers found the Buddhists and Taoists, opponents of Confucians, helpful to them. Tartars tried to invade the south. But as it was unsuited for cavalry, they were disastrously defeated in 387 A. D. Toba Wei, a Tunggee tribe, fell upon the defeated Tartars and occupied N. China. They adopted the Chinese language and manners, and intermarried with them. In 500 A. D. Toba Wei emperor forbade the use of Tartar language and costume. Toba Weis also favoured Buddhism. Taoists antagonized both Buddhism and Confucianists who called Taoism the superstitious cult of stupid people. Taoist Ko Hung (Pao Pu Tzu), a contemporary of Tsin Yan Ti, the first emperor to establish the capital at Nanking after the fall of Loyang to Tartars, was an alchemist. He wrote a book

(Pao Pu Tzu Nai Pien 4) describing an elixir of rejuvenation whereby the "white hair becomes black, lost teeth will grow again, the strength of the body will be renewed. He who takes it will never grow old; an old man will become a youth once more; he will live for ever and not die." Ko Hung in the same book (Pao Pu Tzu Neipien 16) gives a recipe to make artificial gold through chemical process: "Use a large iron vessel 1 foot 2 inches in diameter, 1 foot 2 inches in height and a small iron vessel 6 inches in diameter. Take ($1\frac{1}{2}$ lb) catty of pounded red clay, 1 catty of nitre, 1 catty of talc, one catty of Tai iron ore, half a catty of sulphur and one catty of ice. Reduce them into fine powder. Put inside of the small iron vessel to a thickness of $2\frac{1}{8}$ th inches one catty of mercury, half a catty of cinnabar and half a catty of *liangfei*. The method of making *liangfei* is to heat 10 catties of lead in an iron dish on a furnace. Soon 3 oz of mercury will appear out of melted lead. Ladle this out with an iron spoon; it is called *liangfei*. Stir all these together until mercury cannot be seen. Then put the mixture in the little iron vessel and cover it with talc and an iron lid to protect it. Put the iron vessel on the furnace, and heat it on a fierce fire for three days and three nights. It becomes red powder. Take 10 catties of lead, heat it for 20 days and add the red powder to molten lead; and immediately it changes into gold." This silly alchemistic Taoism prospered and received imperial patronage of Wei dynasty (386-567 A. D.). The rivalry between Buddhism and Taoism was the cause of persecution of both. Buddhism was persecuted in 414 at the instigation of Taoism on the ground that it was an alien creed. In 556 the ruler of northern Chi State occupied the northeastern provinces with the idea of unifying the two rival religions. Buddhist monks having proved victorious in the debate, Taoist priests were forced to shave their head to be Buddhists. In 574 the emperor of Chu dynasty proscribed both Buddhism and Taoism and forced the Buddhist and Taoist monks to marry the Buddhist and Taoist nuns in order to return to secular life. Buddhism was popular. In 406, Chinese historians declare that 9 out of 10 families in Wei had embraced Buddhism. In 500 A. D. the whole of China, north and south alike, was Buddhist. Buddhist rites and ceremonies were everywhere practiced. Buddhist

temples and monasteries rose in every part of China. Buddhist monks and nuns were numerous and highly respected. Only a few Confucian scholars refused the Buddhist salvation which their family and particularly their women folk eagerly embraced. Though the Chinese emperors became Buddhists, they also continued to worship Heaven, the Earth and Air. Translation of Sanskrit Buddhism continued with unabated zeal, both by Indian, Parthian, Yuechi and Chinese monks. In 399 A. D., the Chinese monk Fa Hsien of Changan travelled across Central Asia, Turkestan, Afghanistan to India, all flourishing Buddhist territories. Fa Hsien travelled all over India for nearly 14 years to gather Buddhist books. Then from Tamralipta he sailed for Ceylon, both strong bases of Hinayana Buddhism. From Ceylon Fa Hsien reached Java. From Java he took a sailing vessel which in a stormy weather lost its own direction and reached Shantung coast without seeing land for 70 days. Then the ship reached Canton. After his return of 14 years sojourn Fa Hsien settled in Nanking where he devoted the rest of his life in translating and interpreting the sacred Buddhist texts he had brought with him. The piety of Fa Hsien bore fruits. A hundred years later Liang Wudi, the emperor of the South, became an ardent Buddhist, and by his orders and patronage, the Tripitaka collection was published in 517 A. D. Two years later, in spite of the protests of the court, he became a Buddhist monk, and entered the principal monastery of Nanking. With difficulty he was persuaded to leave the monastery and to return to the throne, which he did after having paid a heavy ransom to the Order for leaving it. Two years later in 529 however he again became a monk, which he was again persuaded to leave, after paying a still larger ransom. The northern State of Wei was neither behind in Buddhist ardor. Its ruler Hsiao Wei issued the second edition of Tripitakas in 538 after the dowager empress Hu had spent vast sums in building Buddhist temples and monasteries. But with the spread of Buddhism, it was not only assimilated by Taoists in their magic alchemist mysteries, it was also split up into different sects. It is said that one Buddhaharma, a Persian convert, lived at Loyang between 516-584, and he preached that contemplation (Skt. dhyana = Ch. Chan) was the essential road to enlightenment (Buddhahood) which stays dormant

in every being. With this consciousness every one can become a Buddha in his own life. This Chan School which flourished in China and later in Japan (*Zen*) did not care for theology, but only for inward enlightenment and knowledge. In 563 A. D. Paramārtha came to Nanking with the Chinese Mission via Tāmralipti and introduced Śrāvastivāda (Chien Shue Tsung) and began translating Sūvarṇa Prabhāsa Sūtra. A Chinese Buddhist monk Chihkai of the monastery of Tientai in Chekiang preached an eclectic Buddhism (Tientai after the monastery; Jap. Tendai) which declared every man was a potential Buddha and by inner enlightenment he could retain Buddhahood. Chihkai died in 597, and it became very popular. Kumārajīva lived in Kuch about 352 A. D. Tsin emperor Fukien (357-384) sent an envoy to Kuchean ruler for sending the learned monk to China. Kuchean ruler refused to accede to the request. The combined army of Kuch, Karashar and Och Turfan was defeated and Kumāra Jīva was taken a prisoner. Kumāri Jīva came to Changan in 381 and he was made the chief priest (Kno-shih). Kumāra Jīva translated about 121 books, of which 59 now only extant. He translated Sukhavatī Vyūha (Amita Changa), Amida of the Japanese, first translated by Parthian prince monk Shikao and his contemporary Lokeshan. Buddha is born on lotus in paradise Sukhavatī (Heitien), the western Heaven. To be born in the western Heaven, it is not necessary to strifle all desires, but only to do good to all men by compassionate sympathy. Thus Kuan Yin (Boddhisattva Avalokitesvara) became the goddess of mercy who hears the cry of the world, and out of compassion for the suffering humanity, she postponed her own Buddhahood until every living creature has been released from suffering and has been raised to her status. Mañju Sri (Wen Shu and Pu Hsien) is associated with sacred hills of Omei in Szechuan and Wu Tai Shian in Shansi. Maitreya (Mi Lo Fo), the friendly Buddha, is the coming Buddha that will bring justice, amity and happiness to all mankind. It was not however till the end of the Tang Dynasty, Amida cult became popular and fashionable. Sui dynasty uniting the north and south in 581 encouraged Buddhism. The Sui sovereigns published three editions of Tripitaka within the short space of two decades. Early in the Tang dynasty Hsien Tsung, the friend of

Tang emperor Tai Tsung, started from Changan across Turkestan, Samarkand and Afghanistan, and in every place he found Buddhism in a flourishing condition, and the people were friendly, prosperous and happy. Hsien Tsung was born in Honan, the son of a learned official. Reared in the Confucian tradition, in his youth he was converted into Buddhism, and became distinguished as an exponent of Buddhism. But dissatisfied with his knowledge he wanted to get at the original sources in India. And in spite of emperor's request to stay at home he started for India in 629, going by the overland route through the Tarim basin. In Kashmir he was royally received. Throughout the plain he was the honourable guest and friend of emperor Harshavardhana of Kānya Kubja who had already opened diplomatic relation with the powerful Tang emperor. In Assam he was the guest of Bhāskarāditya. He visited famous universities like Nālandā where Buddhism was taught by learned distinguished scholars. He also visited famous Buddhistic places of historic importance and worship. After an absence of 16 years, Hsien Tsung returned to China by the land route, bringing with him no less than 657 Buddhist texts, a number of Buddha images and of Buddhisticvases of precious materials and curious workmanship, and 150 genuine relics of the Buddha. Central Asian Buddhistic art was also represented. Hsien Tsung became however converted into Madhyamāyana school of Buddhism during his sojourn in India, and on his return he preached it. It preached that our consciousness is only real. The universe is but a projection of our consciousness. Hsien Tsung was received with great honours by the Tang emperor Tai Tsung, and enjoying his friendship and patronage spent the rest of his days in translating the books he had brought with him. But he lived only 19 years after his return and died in 661. Tu Shun founded a school Hsu Yen Tsung, a Mahāyānist belief, which believed in past, present and future Buddhas, manifestations of one primal one, thus creating unity, transcending all divergences. Tu Shun died in 640 at the age of 84. Tao Hsuan who died in 564 founded Lu Tsung, preached that the main doctrine of Buddhism was universal love, sympathy and benevolence. Li Shihmin, the founder of the Tang dynasty, the son of a provincial governor, was connected by marriage with Li

Tu Ku Tarsara, imperial Sui and northern Chou. Forcing his timid father, he revolted against the Sui, and in 6 years reunited the whole of China, although his father exercised the titular sovereignty. After his own accession in 597, he repulsed the Turkish hordes, menacing the northern provinces. In China where a scholar is more honoured than even a victorious general, Li Shimhin (Tai Tsung) became very popular, not only for his illustrious ancestry, and he brought peace and security throughout the whole united China, but as a scholar, lover and patron of arts, poetry and philosophy. He honoured the memories of scholars. And he ordered that in all colleges of the empire, honour should be paid to Confucius, his chief disciples and 22 noteworthy Han scholars. He retained the distinction between civil and military officers. Civil servants of the empire were selected according to the merits from those who topped the list in the successful degree examination, where not only Confucian literature, but history, law, mathematics, poetry and philosophy were important subjects. But scholars who were not degree holders, but able and recommended for their literary attainments or whose ability he himself remarked, were also appointed by him in responsible positions. Instead of repairing the Great Wall which had fallen into decay, he conquered the eastern Turks (630), defeated the Uighurs (in Gobi region), Kitans in eastern Mongolia and south Manchuria, and Yuechi in Tarfan and Tarim basin were brought under subjugation. Garrisons were put at Kashgar and Yarkand. Samarkand and Bokhara acknowledged Tang suzerainty. Even Afghanistan came within the sphere of Chinese influence. But he died only at the age of 49 in 649. Tai Tsung was succeeded by his son Kao Tsung. Wu Chao, a pretty Chu (Yuechi) maiden, became concubine of Taitsung in 637 at the age of only 12. But though she was at the prime of her youth, at the age of 24, at the emperor's death, according to the custom, she with all other concubines, was forced to enter into a Buddhist convent to pass the rest of her life with shaven head as a sister of mercy. This was too much against her taste. When Kao Tsung made a ceremonial visit to the monastery, this fascinating beauty with her bewitching smile captured the young emperor, who took her back to the palace as his concubine, and later made her the

empress, the consort being killed by palace intrigues. Kao Tsung was absorbed in amours and Buddhism. He hated war. And times were hard. Arabs under the impulse of Islam were on their conquering march. Flushed with unprecedented successes and victories, they fell upon the tottering Sassanid empire, weakened and exhausted by a century old struggle for supremacy with the Byzantine empire, and the Turks and the Sassanide collapsed. A Sassanid monarch defending desperately the last corner at Merv appealed for Chinese military aid. All Kao Tsung did was to welcome Firuz, Yesdegerd's son, and made him a general of the imperial guard. A few of the Sassanid princes found refuge in the splendid palace and a monastery he had built at Changan, and employed some of them in the imperial service. Persian refugees were allowed to build temples and practice Zoroastrian faith which flourished for many years. Emboldened by this, Tibetans in alliance with the Arabs wrested some of the cities in Tarim basin and Transoxania. Turks captured Bl. Mongolians and Koreans threw off the Chinese yoke. Empress Wu Hou had virtually taken the reins of government in her own hand. Though she was busy at officiating at the imperial sacrifices, changing the dynastic name to Chou, the name of her own family, and had her favorites, a Buddhist monk, and later two handsome brothers with whom scandalous stories were whispered, she was, able and energetic. She recovered Tarim basin in 692. She lavishly spent for Buddhist monasteries; under her guidance Buddhist sculpture reached the height of its beauty, artistic and religious inspiration. In Chinese history only two other women can rank with her in administrative ability and power, empress Lu of Han and Dowager empress Tzu of Chin dynasties. But like the Han empresses she never entrusted her relatives with any high office which was the main cause of the dissention and ruin of the Hans. She ruled by her own administrative genius, during the long life of her husband (649-683). After his death, she assumed the sovereignty in the nominal reign of her son—Chung Tsung. Chung Tsung (683-710) had no personality. For his intrigues against his parents he was put into prison. Wu Chou even thought of appointing her brother's son as her successor. But her ministers were against the change of dynasty. However being released

from prison of his father's death he began to intrigue against his mother. And in 705, when old and ailing she was forced to resign her regency in Chang Tsung's favour and retire to the same monastery to which by customs she was condemned 50 years ago. But she died in the same year at the age of 81. During the five years that followed the death of the empress, the court was convulsed by the intrigues of princes of the imperial family and the ladies of the court to dominate the weak king. Finally Chung Tsung was done away with in 710 through poisoning by his own wife who wanted to play the part of her mother-in-law Wu Chou. But the plan was frustrated by Li Lung Chi, son of empress Wu Chou's second son Li Tan. Li Lung Chi occupied the palace with the help of the imperial guards, and made his father emperor. On his abdication two years later, he ascended the throne as emperor Ming Huang, posthumously known as Hsien Tsung (712-756). He raised the Tung empire to the highest pinnacle of glory, and brought by his own folly its disgraceful end. In 716 arrived at Changan Subhakarasiṃha who had lived at Nālandā. Though he was 80 years old, he taught—that salvation lies through mystic utterances—mantras (Chen Yen) through which saviors like Virocana and Vajrapāṇi can be invoked. He died 735 at the age of 90. It is said that Śrimitra or Kumāra Śrī of Kucha was the first Tantrist who came to China in 807-812 A. D., and translated Mahamayūri and Dharaṇī in Chinese language according to Tibetan chronicle *Dub-thah-sel-kri-melon*. Vajrabodhi born in Malaya (Malabar) in 680 was a preceptor of the king of Kienche (Kāncī). At the age of 58 with his disciple Amoghavajra, he went to China 719. Between 723-782 Vajrabodhi translated into Chinese 11 Tantrik books. He died in 782 at the age 71. Vajrabodhi taught Vajrayāna (Shinson). And Vajrayana Tantra was found such an enticing philosophy that it became the fashionable study of the aristocracy. Hsien Tsung requested Amoghavajra to go back to India with some Chinese courtiers to get as many Tantra books as possible. After his return in 746 Amoghavajra was honoured with the title of Chu Tsung—the repository of wisdom. Thinking that sexual union being the pleasant way of entering into eternal bliss he forced 12 thousand Buddhist monks and nuns to get married and forbade the building of monasteries.

Yet Hsien Tsung was an enlightened ruler. In Changan he established an academy (Hanlin Yuan), the membership to which even in later centuries was regarded as one of the most highly prized literary honors. He founded a school for the teaching of music. At his court were some of the distinguished poets and painters whom China has known—Li Po and Tu Fu among the poets; Wu Pao Tzu, Han Kan and Wang Wei among his landscape painters. But Hsien Tsung loved soft music, arts of love and poetry, more than war. However in 747 Hsien sent Kuo Hsien Chih, a general of Korean extraction who led an expedition from Kashgar across the high and difficult passes in the Pamirs and the Hind Kush to the upper Oxus and Indus with the object of breaking the connection which the Arabs had formed with the Tibetans in 741. In 751 he sent a Chinese military staff, including Wu Kung to the ruler of Kipin to resist the aggressions of the unbelieving Arabs. The military mission left behind Wu Kung who was ill at that time. Wu Kung was nursed to health in a Gandhara (Kienlotan) monastery. He became a monk Dharmadhātū (Tamolotū) in 757, and studied 3 years in Nālandā. Wu Kung returned through Central Asia, Kucha, Peiling and Uigur Turks who were not Buddhists. Wu Kung after 40 years' travels reached in Changan 790, an old man of 60, and was honoured by the king whom he presented with a Buddhist relic. He said that Turks alone were fighting the Arabs. Between 705-715 Islamic arms were carried to Sogdiana, and the Tocharian, Samarkhand, Bokhara and Tashkend princes who had formerly acknowledged Chinese suzerainty, were appealing for Chinese help to drive away the iconoclastic invaders. But in vain. Karluk and Uighurs were driving away the Chinese influence in the west, north and east. Kitans from Manchuria were entering into the North China plains. Yuanan under the instigation of Tibetans who gave to the king of Nanchao the title of Tungti—the emperor of the east, revolted in 761. Yet Hsien Tsung was dallying with his pretty concubine Yang Kue Fei and her love intrigues. Yang Kue Fei was the wife of his son Prince Show. Captivated by her beauty in 745, though Hsien Tsung was nearly 60, he forced Show to divorce her and gave him another bride as a consolation. And he himself took her as his concubine. But she began to

dominate him. An Lu Shan was a Kitan. At an early age he was captured, and sold as a slave to a Chinese officer. By his ability he rose to be a general. He became a trusted officer of Hsien Tsung. Yang Kue Fei took a fancy of this daring officer, and in order to fool the emperor, called him her adopted son. An Lushan being in favourable eyes of pretty Yang Kue Fue and her doting husband obtained increasing power, influence and honours. He was made governor of the frontier province of Liao Tung in charge of the best troops of the empire. In 750 he was made a second class prince, though the title of was reserved only for the member of the imperial family. Yang Kue Fue's brother Yang Kuo Chung was made the first minister of the empire through her influence, ousting the experienced predecessor of the office. The minister out of jealousy of the power of An Lushan complained to Hsien Tsung that An Lushan was plotting to revolt and to capture the throne. Hsien Tsung did not believe such a conspiracy against him and his concubine's favourite. But when the crown prince joined the minister in the protest against such a faith, An Lushan was summoned to the court. An Lushan fell at the emperor's feet and with tears in his eyes implored him and his concubine to test his loyalty. The emperor thought it was a calumny against his favourite by his enemies. He loaded him therefore with first honour (752). But within three years An Lushan having the best army at his command raised the standard of revolt. The rebel army crossing the Yellow River captured Lo Lang, the ancient capital without any opposition. And even when the rebel army attacked Changan, the emperor with his small inadequate imperial guard did not think it prudent to offer any resistance, and retreated to Ma Wei, a town in Shensi. There the angry imperial guard, finding Yang Kuo Chang in conversation with the Tibetan ambassador that the brother like the lover of Yang Kuei Fei was betraying the state to foreigners, fell upon him like hounds and tore him into pieces. The emperor tried to pacify the infuriated guard, but they clamoured for the head of pretty but devilish Yang Kuei, the source of all troubles, and thinking that the refusal might cost him his own life, ordered the chief eunuch to conduct her to the chief pagoda of the palace and strangle her there. This everlasting

wrong is the subject of the poem by Poshu, and of other countless plays. Hsien Tsung fled to Szechuan, but was forced to abdicate in favour of crown prince Su Tsung who rallied the people of north-west under the imperial commander-in-chief Kuo Tzu, and got help from friendly and allied nations. Even the Caliph sent a contingent of Arab soldiers. Yueshia and even Hsiungnu soldiers came and fought. Though An Lushan and his son were assassinated, the war dragged on for 10 years and final peace was restored only in 763. The Arab soldiers did not return, but marrying Chinese girls settled in north-western provinces. Few Buddhist monks came to China at this troublous times. But Prajna of Kapisa came in 785, translated 4 books and died in 810. Prajnā's *Mayāyāna Mulajāta Hridayabhūmi Dhyaṇa Sūtra's* preface was written by the emperor Hsien Tsung (806-820) himself.

Though the Tang empire was weakened by An Lushan's rebellion, it still preserved the internal peace, especially in the south, where 250 year's undisturbed tranquility had brought great prosperity and cultural progress. But Nanchao consisting chiefly of Mon-Khmer tribes as Palang, Miao-Miao, Lao-Lolo and Negrito Hala tribes and their blends (platyrrhine dark complexioned submedium brachycephala) invaded Annam (peaceful south); racially of the same stock. Northern army defeated them. But being stationed for a long time in unhealthy places on the border of Annam with very little pay, they revolted. The rebel army being homesick marched north, swelling their ranks with the discontented elements and they crossed the Yangtze with very little opposition as the imperial generals were divided among themselves. Huang Tiao who failed in the civil service joined and led the rebel forces in 875. He led them back to the south where there hardly was any imperial garrison and captured Canton in 879. The northern army again being dissatisfied with a long sojourn away from their home lands marched north and captured the imperial capital Changan in 881, and the Tang emperor fled to Chang Tu in Szechuan. Though the Tang empire nominally existed for another 27 years, fall of Changan heralded the dismemberment of the Tang empire between rival military commanders and provincial governors. Huang Tiao's rebellion was

put down when the leader was killed in 884. Though the emperor returned to Changan, every province was governed by the general as an independent ruler who reconquered it from the rebels. In 904 Chu Wen, one of the rebel generals of Huang Tsao, now governor of Honan, raided Changan, sacked it and carried off the emperor as his prisoner and forced him in 907 to abdicate in his favour. This Chu Wen's usurped sovereignty was repudiated by other governors who began to rule in their own provinces as sovereigns.

Kitans who originally inhabited the Amur and Sungari valleys hearing of the disposal of the Tang emperor raided northern frontier provinces of China. Shing Ching Tang, son-in-law of the next to the last Tang emperor, plotting for the Tang downfall, called to his aid the Kitans. When by the aid of the Kitans, he founded How Chin (Later Chin dynasty 936-947), Kitans obtained north-eastern Hopei province, Manchuria being conquered by them earlier, and he called the Kitan emperor Apaoki, Father Emperor, and himself Obild Emperor. When Apaoki swept down the Great Wall he was said to have 300,000 fighting men under him. Shi Ching Tang's son attempted to throw off the suzerainty of the Kitans, but was taken a prisoner by them. The throne thus made vacant was occupied by a general of the late dynasty, Liu Chih Yuan of Mongol descent, known as How Han (Later Han : 947-951). In 961 the commander of a victorious expedition against the Kitans was raised to the throne and known as Hou Chou (Later Chou : 961-960). Chao Kuang Yir (Tai Tau), a descendant of Tang officials and the commander of the Later Chous, was proclaimed emperor by his soldiers and founded the famous Sung Dynasty which reunited the third centralized empire, famed for its uninterrupted peace for nearly 3 centuries, developments of arts, industries and literature. Yet though during five dynasties army officers fought for supremacy, administrative machineries with permanent civil officers went on practically undisturbed. Fang Tao, an able statesman, known as *ever gay old man*, held high office under all the five dynasties. In the state of Shu (Szechwan) at the downfall of Tangs, classics were engraved on stone and set up in the capital Chengtu, and at last by parts it was printed by wooden blocks as early as 932.

Under the inspiration of Feng Tao, even during the changing dynasties, an imperial commission prepared a revised text of the classics, and the completed edition, printed by wooden blocks, was presented to the emperor in 963. The supply of books thus made cheap and abundant united and disseminated Chinese culture far and wide.

Though Sung Empire tried to unite all the Chinese people, north-eastern Hopesi and Lio were occupied by Kitans. The Kitans used to plague the Sung. From time to time the Sung were compelled to sign agreements with the Kitans, yielding them territory and promising them tributes. The Sung capital Pien Liang, the present Kaofeng in Honan, was at least once in danger. But after making peace with the Sung empire in 1004 by which the Kitans received a large annual tribute, Kitans were not very aggressive except for some unsuccessful attempts to conquer the Hsia kingdom. Kitans became peaceful, adopted Chinese culture and to foreigners, they were Chinese people. North China, occupied by the Kitans, was called Cathay, and Russians even today call the Chinese people Kitai, a variant of Kitan, and in India as Kayāth, Sanskritized into Kayāstha. Another Tangut people, speaking a Tibeto-Burmese language, descended the upper valley of the yellow river and established themselves on the north western province of China in Kansu stretching out towards Turkestan, displacing the Turkish Uigurs in the later years of Tang dynasty. They got the Tang imperial title Li as a reward for their assistance against the rebel Huang Tiao. But in 981 they refused to acknowledge the authority of the Sung and proclaimed their ruler as the king of Hsia. Though they adopted Chinese culture to certain extent, the Chinese land route to the west was barred for in 1028 the Hsia conquered the whole of Kansu province, made Ning Hsia their capital and occupied the important cities of Liang Chou, Kan Chou and Su Chou on the caravan routes to Central Asia. Hsia was a powerful warlike kingdom and it lasted until it was overwhelmed by Mongol conquest, though the Hsia fought desperately and were slaughtered mercilessly by the Mongols. To get the valuable Chinese silk and Sung porcelain, there were large trading colonies of Arabs and Persians in Canton,

Chuan Chan in Fukien and Hang Chou where they were allowed to reside and follow their own religion.

Uighurs, a Turkish tribe, often fought the Hsias to regain their domination, and Sung usually encouraged and helped them. Hsias were also sometimes attacked by the Kitans. Nu-Chen (Golden Tartars), perhaps a mixed Tungus people, dwelt on both banks of the Amur and Sungari rivers as a tributary of the Kitans, indeed their own peoples. Early in 1114 the Nu-chens attacked the Kitans, with Sung as allies. Liao Kitans resisted in vain their hardier opponents Nu Chens or Kins. The Kins (Kanvas of Magadha) completed the conquest of the whole of Kitan Liao Empire in 1124 and drove the remnants of the Kitans to seek refuge in western Turkestan. There the Kitans established themselves in the Ili valley where they became known to the peoples of Western Asia and Eastern Europe as Keraites (Skt. Kiratas), Kara-Kitan = Karakataniga of Kashmir, Karana, an Orissa tribe, Kitary, Catharyans (Kāyaths = Skt. Kāyasthas). The Tungus in India entered into Orissa where rulers are known as Jayatunga, Salama Tunga, Gayad Tunga, Vinita Tunga, and in the South Chola Tunga and Tungabhadra River.

The Sung emperor Hui Tsung was soon disillusioned of his alliance with the aggressive Kins. He thought it would give him an opportunity of re-occupying north-eastern Hopei, once the hated Kitans were conquered and driven away. When Liao fell, the governor of Ping Chou (Yung Ping) refused to submit to the Kins and offered resistance. Hui Tsung dispatched an army to take possession of the territory. This intervention infuriated the Kins who thought that their relation with the Kitans or Kitan's state was but a domestic problem with them. The Kin cavalry attacked the Sung empire, poured over the frontier and swept down to Kai Feng itself. The desperate situation compelled the Sung to conclude peace by a heavy ransom to get rid of the invading forces. Hui Tsung abdicated in favour of his son. The minister Tsai Ching, responsible for the disaster, was exiled. The ministry persuaded the new emperor to break the pact and attack the returning Kin army. This folly cost the Sung empire about $\frac{1}{2}$ of its territory. The peaceful Chinese army

accustomed to luxury was no match for fierce Kin cavalry. They scattered easily the Chinese forces, besieged and captured in 1126 the Sung capital Kai Feng with two emperors, the entire court and carried away more than 3000 prisoners of rank. The Kin cavalry moving in all directions crossed the Yangtze, captured and sacked Hang Chou and Ningpo. Central China, full of lakes, canals and marshes, was unsuitable for Kin cavalry. And dissension rose among the Kin generals. The Sung emperor Kao Tsu, who escaped from Kin prison and enthroned, believed that continuation of the war would be disastrous for China. So in 1141 putting to death the war minister Yo Fei, peace was concluded with the Kins, by ceding them seven provinces, everything north of the Hwai River. The Sung empire retained the Yangtze valley and everything south of it. So China was divided between two empires. The Kin empire also included Manchuria and Mongolian plain. They subdued Hsi Hsia and received the submission of the Nighurs. In 1153 they moved their capital from Manchuria to Yenching; later called Peking. The Kins slowly began to adopt Chinese culture. They translated the classics into Kin language and made sacrifices to Confucius. Hsi Hsia chiefs, now vassals of the Kins, were also adopting Confucianism.

The Sung fostered agriculture, arts, and literature. They produced the best porcelains, still unrivalled with all modern technical excellence. The ministry of Wang An Shih preached the autocratic monarchy. Agriculture he regarded as the fundamental occupation, the peasantry, foundation of the state. The state made loans to the farmers in proportion to the amount of land sown and the loan was to be repaid with light interest at the harvest. For forced labour in the execution of public works, a graded tax according to the wealth of the family was substituted. Commodity price was fixed and no profit was allowed to exceed $\frac{1}{10}$ of the value of the goods sold. Produce rents were transferable for cash rent. Silk and grain rents instead of being transported to the capital were allowed to be sold in the same province or in the neighboring deficit provinces. To prevent and to detect crimes, local peoples were held responsible. Every family having more than 2 adult males had to provide one soldier armed with bow and spear and trained in the use of these

arms. The society and the government were controlled by a large class of scholars who owed their position to education and classical training. Paper currency was one of the outstanding features of the Sung fiscal policy. The Sung period saw many famous landscape painters of which Ma Yuan (1190-1224) and Hsia Hsia Kuei were very famous. Hsia Kuei's roll of the Yangtze from the wild mountain of the Tibetan border where rocks and chiffs pen the river in a narrow gorge down to the wide and tranquil valleys is one of the most valued treasures of the Peking Palace Museum. The finest of the Chinese porcelains were developed under the patronage of Sung emperor Hui Tsung. The kilns were established between 1107-1117 in the precincts of the imperial court near Kai Feng Fu. The *Kuan* porcelain varied in colour, often of a pale bluish green, but of very fine finish. When the Sung capital Kai Feng Fu was captured by the Kins, the Kuan kilns were abandoned. The artists migrated to Lung Chuan where new kilns were opened, known as *Ko* ware, famed for the crackle in the glaze. It was exported by the Arabs to Egypt and even to Europe. The Lung Chuan kilns continued to produce famous articles upto the early years of the Ming dynasty. In Hopsi Ting Chou was noted for its pure white porcelain of a slightly ivory tinge under the patronage of artistic Hui Tsung. It produced its ware even during the Tung dynasty. The pottery tea cups of Chien Ning Fu of dark purple or blackish brown colour were famous and known as Chien ware, and Temmoku of the Japanese. During the first Sung emperor Tai Tzu 300 Chinese monks came to India on pilgrimage (Fotsu Tung Chu. Nan Jiao 166), of whom Kiye wrote a short account in his Journey. In 971 came Manjusri, a son of king of Western India who adopted Buddhism. In 973 Dharmadeva came and translated many books. In 975 came Sankhasvara, a son of a ruler in Eastern India to pay homage to the Sung emperor. Mongolia was under the domination of Keraites (Kitans). But Temuchin, a Mongol of the eastern Baikal region, confederated some of the Mongol tribes and attacked the Keraites who recently became Christians and conquered north-eastern part of Mongolia (Naiman). He established his capital at Karakorum in Urga. He got submission from the Uighurs and Karloks and was proclaimed as Janghiz Khan—the universal emperor.

Jenghiz Khan attacked Hai Hsia (1204-1209) and got their submission. The Kin provinces of Shansi and Hopsi were invaded in 1211 and the Kin capital Yeu Ching (Peiping) fell into the hands of the invaders in 1214, though Kins offered stubborn resistance, and removed their capital to Kaifeng. Korea submitted to the Mongols in 1210. The Kins were now hemmed in between the Mongols and Sung. And they appealed to the Sung to protect the country from the invasion of the Mongols. But the Sung emperor lured by the promise of some of the Kin possessions, made an alliance with the Mongols, and sent an infantry which the Mongols lacked to capture Kaifeng, and Tsai Chou in Honan. Kins fought with desperation but Kaifeng fell after a long siege in 1233, and in 1234 the Kin ruler came to an end with the suicide of one and killing of another. When after the fall of Tsai Chou, the Mongol cavalry was moving northward, the Sung emperor, forgetting the lessons of history, sent his army to seize Honan. This folly cost him his empire, and the domination of entire China for the first time by a foreign tribe, though allied basically in race, but different in culture. Though the Chinese fought stubbornly, it was in vain. Though besieged Hsiangyang and Wanchang on the Han resisted for five years (1263-1273) then but surrendered. The Sung capital, the present Hang Chow, was occupied in 1276 and the infant emperor was captured and sent north. Some of the Sung generals and statesmen declared another member of the Sung family as their emperor and sailed in a fleet for Canton. Canton fell in 1277; and the luckless boy emperor, now a fugitive, died in the next year. Another scion of the Sung was made an emperor on a fleet which sailed off the coast of Kwangtung. But here also they were trapped by the Mongols, and the Sung commander bidding his wife and children throw themselves into the sea; took the boy emperor on his back, plunged himself into the waters of the bay on the coast of Kwangtung. Thus in less than a hundred years Mongols occupied and ruled the entire Chinese territory. Some of the Sung fled to Annam.

14.—SEX LIFE IN ANCIENT INDIA

In Yoga literature sexual abstinence (*Urdhvarata*,) and resorption of the semen through the rich plexy of lymphatics of *vesiculae seminales* (*seminal canals* ; *urdhvarata*) have been emphasized as the source of physical and mental health and vitality, causing rejuvenation and prolongation of life. It is well known that the functional inactivity of any organ will cause its degeneration and atrophy. If the accumulated semen is not periodically discharged, the congestion and back pressure in the seminal vesicles exert tension on germinal epithelium, and seminiferous tubules degenerate and atrophy. The shrinking of the seminiferous tubules provoke the interstitial spaces between them as a compensatory measure, and the interstitial cell glands enlarge. These interstitial cells are aggregations of epithelioid cells containing both acidophile and basophile granules, resembling the anterior lobes of the pituitary and suprarenal cortex and like the latter, mesoblastic in origin. The interstitial cell alone is the endocrine gland. It alone produces the hormone which being absorbed in the blood develops the secondary sexual characters. By its stimulus the seminiferous canals, hitherto round and smooth, become turgid by the development of large spermatophore cells which produce clusters of spermatozoa. Spermatozoon is about $\frac{1}{250}$ of an inch in diameter ; about 326,257,000 are produced in both testicles per week. This is why warriors, mystics and scholars abstain from copulation when sustained physical and mental exertions are necessary. Not only by this, the hormone producing gonads are stimulated but all endocrine glands, as all of them are interchained. The reactivation of the gonad favourably reacts on the other endocrine glands, thus improving the general health and vitality. This is the reason why such wonderful results are obtained by ligating the excretory spermatic duct—*vas deferens*. Vasoligation is carried out at the point where it leaves the epididymis (*vas deferens*), or where it enters the epididymis in the shape of minute canals—*vasa efferentia*. *Vas deferens* is dissected not

to damage the fine blood vessels and is then ligated in two places with silk sutures; the part between the two ligatures is finally severed. The seminal thus dammed without an outlet exerts back pressure, brings out degeneration of the seminiferous tubules. And the consequence is that interstitials proliferate and multiply at the cost of the atrophied seminal canals and tissues. What is accomplished by surgical operation, the Yogis did it by physical exercises, mental discipline and self-control, and the resultant favourable reaction is the same.

The sexual urge, intensity and volume vary in different persons. The gonadic functioning is dependent not only on race and heredity, but also on the age and general health of the individual, nutrition, climate and environmental stimulus. Some of the secondary sexual characters such as stature or beard, size and shape of the breasts or pelvis, lustre and shape of the eyes or hair, size or hyperplasia of the sexual organs are both racial and co-related with endocrine glandular functional activities. The Caspians and Negroes are the tallest in stature, ranging from 6-5 feet to 7 feet; the Semites and Aryans from 6-2 to 6-5 feet; the Alpines about 5-9 to 6 feet; the Mediterraneans from 5-2 to 5-6 feet; Mongols and Malayas below 5 feet; Negritos are the dwarf pigmies. Hyperfunction of the posterior lobe of the pituitary leads to gigantism. In Eunuchoid hypogonadism there is marked statural overgrowth with characteristic delay of sexual maturation; extremities are disproportionately long. There is not only no growth of genitals, but deficient development of secondary sexual characters. Fat accumulates over the lower abdomen and iliac region. When the disease develops early, secondary sexual hair fails to develop at all or at least is scanty. In late eunuchoidism, the diminution in the size of testicles, scrotum and penis is often striking. The hair of head is dry. Secondary sexual hairs fall out. The average height of the eunuchs exceeds the normal. The eunuchs have disproportionate long arms and long legs. The epiphyses remain long ununited. The neck remains infantile. The back of the head is flattened. Pelvis is broad. Fat accumulates in the buttocks and breasts and over the trochanters and crests of the ilia. A eunuch may have a good head of hair, but the beard is absent except some lanugolike growth on the upper lip. In advanced life a few hairs

may appear on the face, similar in distribution to that seen in old women. The hairs are scanty. The crines pubes are feebly developed and are feminine in type. Hairs do not develop in the normal way upon the perineum, trunk and extremities. The thyroid and larynx are small with high-pitched voice. When the castration is done early, the penis, prostate and seminal vesicles remain small. There is no erection. Sexual impulse is absent. Masses of fat accumulate in the lateral half of the upper eyelids, giving the pale sallow skin, thrown into folds, on the forehead and face, a sleepy appearance. In the first world war, some Viennese officers lost their both testicles by gunshots which blew them away. It was found about 2 months later that they showed typical stigmata of castrates. There was a sudden growth of adipose tissues on the neck. The facial hair, especially the moustache, gradually disappeared, and then the pubic hair began to decrease rapidly. The testicle of a recently killed man by motor accidents was transplanted and sutured on the scarified sites. In 3 months all the stigmata disappeared. Beard is luxuriant among all races except the Mongols, Negroes, Negritos and Malayas; eyebrows are long and sometimes joined among the Caspians; they are bushy on the superciliary arches among the Austrians; it is very short and scanty among the Mongols. The pelvis of the Mongols is roundish, of the Alpines ovoid, of the Caspians, Aryans and Mediterraneans is ellipsoid, of the Negroes and Austrians narrow and small. The breasts of the Alpines are oval, of the Mongols globular, of the Caspians, and Aryans are oval ellipsoid, of the Negroes and Austrians pyriform. The cross section of the hair of the Caspians, Aryans, Semites and Alpines is oval-ellipse, an intermediate of the cross sections of the Negro woolly hair which is a lengthened ellipse and the straight hair of the Mongol which is circular. The eyes of the Alpine is black, oval and bright; of the Aryans and Mediterraneans and Caspians almond-shaped; of the Mongols slanting; of the Negroes and Austrians narrow and dull. The sexual organs of the Negroes are the very large, voluminous, but flabby; mons veneris is flat, and the pubic hair is scanty; of the Caspians, Semites mons veneris is well developed and strong; it is roundish with a fatty cushion and luxuriant growth of hair; of the Mongols, Malayas and Negritos, very small, undeveloped;

mons veneris flattened with scanty hairy growth ; of the Negroes labia minora and clitoris are very large.

Pituitary gland situated at the base of the skull seems to be the regulator of the endocrine glands. It has two lobes—posterior and anterior. Posterior lobe regulates structural growth and accelerates calcium metabolism. Its hyperfunctioning leads to gigantism before the epiphyseal closure. But if it continues after epiphyseal closure due to atrophy of *thymus*, there is distorted hypertrophic changes in the bones, known as *acromegaly*. It inhibits the production of pancreatic insulin. It increases the contraction of the uterus and the intestines. The anterior lobe produces two sex hormones—A and B *prolan*. *Prolan A* stimulates in males the activity of germinal epithelium while B *Prolan* stimulates the interstitial cells to activity. The germinal epithelium (of seminiferous tubules) produces spermatozoa, while interstitial cells secrete sex hormones, the basis of nerve force, secondary sex characters, sex urge and vitality. In females A. *Prolan* stimulates follicular development of the ovary while B *prolan* activates cells of corpus luteum. It stimulates the activity of the thyroid, pancreas, milk secretion of the female breasts and regulates adrenals. In the normal hyperfunctioning of both the lobes there is a great growth of stature with the hyperplasia of the genitals. There is sugar intolerance. In the hypofunction of both the lobes (Frohlich's syndrome) there is undergrowth and hypoplasia of the genitals ; obesity and fat pads accumulate about the abdomen, hips, buttock, breasts and shoulders. There is an increased carbohydrate tolerance.

Adrenals produce epinephrin (adrenalin), and continuous supply of this substance to the blood, through which it acts upon the sympathetic nervous system, maintains blood pressure and pulse rate, sympathicotonus in general, and hairy growth. The cortical hormone of the adrenals (cortin) utilizes oxygen of the body and maintains adequate circulation of the blood and sex functioning. The hyperfunctioning of the adrenals in early age hastens *pubertas precox*. There is an abnormally rapid growth, excessive liveliness and unusual strength. Fat accumulates in hips, buttocks, abdomen and mons veneris. There is premature excessive development of hair in pubes, axillæ, and in the male on the face. The external genitals undergo changes that corres-

pond to that of puberty (enlargement of the penis or clitoris, increase in the size of labia, closure of the vulva, turgescence, mammary gland development, menstruation; in boys change of voice with erection and pollutions). These appearances may come as early as in the fifth or sixth year of life, even earlier. Generally it is due to a tumor in the cortex of suprarenals which abnormally increases its secretion. If there is hypersecretion after the age of puberty virilism or hirsutism is developed. Muscular power is excessively developed with an abnormally strong sexual excitability. In women there is hypertrophy of the clitoris though external genitalia otherwise may remain normal except the pubic hairy growth may take masculine form; and long hairs may grow on the abdomen, chest, extremities and shoulders; and moustaches and beards may grow. There may be disturbances in menstruation. Nausea prevails. There is unusual strength and hyperesthesia, associated with obesity. Congenital hypersecretion provokes *pseudohermaphroditism*. Some of these hermaphrodites have internal sexual organs like those of normal females, but their body and external genitals resemble the male type (enlarged clitoris, urethra of male type, prostate, slit like vulva, more or less closed to resemble a scrotum). The opposite type has the external appearance of the female body and whose external sexual organs are that of a male. Adrenalin stimulates the production of insulin. Hypofunction of the adrenals is associated with hypoplasia of the vascular system and genitalia, persistent thymus, large tonsils, low blood pressure and asthenia. It inhibits the production of insulin, and consequently there is sugar intolerance. Hypofunction of cortex produces Addison's disease, bronzing skin.

Thyroid gland is the central organ for iodine, phosphorus and calcium metabolism. It elaborates *iodothyron*. Thyroid regulates the absorption and utilization of food, rate of respiration, circulation, growth, mental activity and functions of the gonads. Parathyroid utilizes calcium and controls the proper distribution of lime salts to the tissues. Its deficient functioning causes nervous irritability, muscular cramps, degenerative changes in hair and nails. In hyperfunction of the thyroid, the combustion of the body is perceptibly accelerated. Protein metabolism is increased; carbohydrate metabolism decreased. The body is

lean, but the temperature high. Pulse is rapid. The skin is thin and transparent. Hair is glossy. The eyes are bright and open. Nervous energy is augmented. Sexual erethism is heightened. Mind is active. Disposition is optimistic. Appearance is youthful, beaming with life and energy. In hypofunction of the thyroid, the body temperature becomes sub-normal. The blood pressure is low. Vasomotor reactions are sluggish. Protein metabolism is slowed. Carbohydrate metabolism is heightened. There is obesity. The skin is thickened, dry and rough. Double chin, pads of fat above clavicles and thick folds on the abdominal wall appear. The hair is coarse, thin and lacks lustre. It becomes dry and tends to fall out. Nails break easily and show longitudinal grooves. There is a feeling of cold even in warm weather, and of weight in the limbs. Memory is feeble and with slowness of thought. Lack of energy and initiative is marked. Sexual urge and excitability are lowered. In congenital myxedema as the child grows older, the head may increase in size, but the rest of the body skeleton remains dwarfed. Many of the ossification centres fail to develop. The child is pot-bellied. Genitals remain infantile. The nose is broad and thick. Nostrils are wide open. The tongue is larger than usual. The mouth is kept open. The movement is clumsy, lacking energy and intelligence. Pancreas has two kinds of secretions—external and internal. External secretions are poured into the intestines in varying amounts according to the foods taken. During starvation the secretion almost stops. With milk diet within 3 to 4 hours. With carbohydrates at the end of the second hour, and with meat diet still sooner. Hydrochloric acids as well as lactic acid and saponified fats are its specific excitants. Amylopsin acts energetically on boiled starches, similar to the action of saliva, converting it to dextrin, isomaltose, maltose, but very little dextrose. Steapsin splits up neutral fats into fatty acids and glycerin, and emulsifies it. Trypsin not only dissolves protein, but also other protein substances such as gelatin. Tryptic digestion differs from pepsin digestion. Pepsin digestion takes place in acid medium of 1-2 p.m hydrochloric acid. While tryptic digestion takes place in neutral or alkaline reaction. Insulin is produced by the pancreatic islands of Langerhaus. Circulating in the blood it

regulates sugar metabolism. But its production is controlled by other endocrine glands. With the hypo or dys-function of adrenals there is diabetes. Diabetes is also found in hyperactivity of pituitary and thyroids. Repeated injections of anterior pituitary damages pancreatic cells, reduces their endocrine secretion insulin, and sugar appears in the urine. So pituitary and thyroids act antagonistically to adrenals and pancreas. It is also found that vitamin C activates insulin production and the deficiency of vitamin C in the food conduces to sugar intolerance. Vitamin B (Panthenic acid) seems to activate adrenals.

The zygotic determination of sex among the insects through the pairing of chromosomes is undeniable in which the endocrine factors play only a minor role if any. But in the higher vertebrates, the fundamental intervention of hormonal action cannot be questioned. The formation or determining power of sex, no doubt, depends upon the action of chromosomes. But the development of sex and its maturity require the protecting power of hormonal incursions. If hyperplasia of suprarenal cortex manifests itself in the embryonic or fetal period, it determines feminine pseudo-hermaphroditism; if it occurs in childhood, puberty is accelerated; in a girl, precocious puberty with virilism; if it occurs in the course of post pubertal evolution, one observes hypervirilization of man. Sexual inversion presents itself only when the tumour develops in a woman and then acquires viriloid aspect. A male castrated rat, grafted with ovaries, acquires female characteristics. A female castrated rat, transplanted with testicles, acquires the morphology and psychic characteristics of the male, thus overcoming the influence of chromosomes, if any. Female or male castrated rat, grafted with both, a testicle and an ovary, shows intermediate and hermaphrodite morphology and psyche. Pituitary hyperfunction is generally associated with ovarian atrophy. In hyperfunctional pituitary condition — in acromegaly, there occurs a great augmentation of sexual libido in both man and woman; corpulence and energy increase. Acromegalic woman becomes virilized, and acromegalic man shows signs of hypervirilism. Pilosity is increased in an animal if it is repeatedly injected with pituitary extracts. In pituitary hypofunction in man, sexual urge does not exist; and the body adopts feminoid type; the fat, the voice

and mentality have feminine accents. These symptoms improve with pituitary opotherapy or grafting. So it is evident like adrenalin, pituitary incertion exercises a virilizing influence. The feminine hormones include not solely an ovarian hormone, but a complex of hormonous incertions. Folliculin regulates the menstrual cycle and the primary phenomena of feminine morphology and libido. Folliculin develops female pelvic girdle for accomodating gestation. In woman the chest is noticeably narrower in proportion to the width of the pelvis. Man's hips are narrow and chests wide. Masculature in man predominates over fatty pads while in female fat predominates over the muscle. In female the subcutaneous fat accumulates in retro-mammary region, in the lower parts of the abdomen, around the hips and thighs. This distribution of fat makes the lower parts of woman's body float in water, thus giving her greater aptitude for swimming. In the case of man it is usual for the lower half of the trunk and the legs to escape fattening. But in the pre-climacteric and climacteric periods when ovarian follicular function begins to decline and then entirely ceases, the subcutaneous fat of the woman invades the upper portion of the trunk, giving rise to the adipose padding of the shoulder girdle and of the arms and the neck, characteristic of the matronly type. In the castrated eunuch fat accumulates and is localized in the mammary, hypogastric, peripelvic and gluteal regions; and the tenor of the voice, fine skin free from sebaceous glands, and hair distribution of the body resemble feminoid type. 80 p. c. of mature women have on their thighs slightly dilated veins which man presents very exceptionally. In a youth the juvenile beard appears as fine down sprouting first in the exterior corners of the upper lip; zygomatic region with prolongation towards the end of the side whisker; region of the chin and submaxillary region. In viriloid woman the hair grows in the same way. The pubic hair in a female terminates above in a horizontal line and below, rarely invades the perinium. In the case of the male the pilosity is thicker and extends upwards the navel, following the centre line of the abdomen and downwards, invading the perinium and the exterior of the anus. In viriloid women, the pubic pilosity may be masculine in shape. The trunk and extremities of the man are generally covered with hair, while in women these

regions are smooth with the exception of the pubes and armpits. In the case of male youths, hair begins to appear first in forearms, legs, thorax, thighs, hands, stomach in the course of many years. The pubic hair is usually curly. In viriloid women, the pilous system acquires masculine characteristics. The hair of the head of women is usually longer, finer and luxuriant, and has less tendency to baldness than in men in whom after puberty there is a tendency of falling out of hair, especially from fronto-parietal angles, making the male forehead appear high. The hair on the nape of adult women terminates by two later prolongations on very smooth skin. In the case of the adult man, the hair on the nape either terminates horizontally or by central prolongation over the nape covered with short and diffused hair. The preliminary symptom of viriloid female is the appearance of down on the upper lip and cheeks; deep voice; equivocal pilosity of the pubes, torso and face, narrow hips; enlarged clitoris. In normal female apocrine glands on mons veneris, axillae and the nipple do not emit sexual odors in their secretions until the time of sexual maturity. In normal male, the natural libido is towards the female; and in normal female the libido is towards the male. In normal female there is a great despersion of erotogenous zones, especially at the junction of mucous membranes as lips, vulvar and anal regions, and throughout the skin, and caresses are quite gratifying to her. But detumescence and orgasm are slow in her while they are rapid in the male. Tumescence in her also needs to be stimulated by the excitability of the male. Female orgasm is bound with the hypersensibility of the clitoris and the secretion of the vulvovaginal glands. In the viriloid woman, due to the hyperfunctioning of the adrenals, not only clitoris is enlarged, orgasm becomes accelerated and pronounced. Down appears in these viriloid women on the corners of the upper lips and cheeks and fine hairs on their legs and hands. It also appears at the approach of the climacteric when ovarian functioning begins to decline, and the female shows a strong sexual urge. Ootestis affirms bisexuality. By grafting an ovary to a testicle in a guinea pig, an ootestis develops with hermaphroditic characteristics. But feminoid conditions predominate both in the genital organs and breasts. Libido is of small intensity. In childhood it is hard to determine the sex of a girl with vulvo-

vaginal atresia and hypertrophy of clitoris; or of a boy with cryptorchidism and hypospadias. Individuals with feminine but possessing testicles, masculine appearance with ovaries, have been found in almost all countries. In pseudohermaphroditism, man resembling woman is called masculine pseudohermaphrodite = pseudohermaphrodite man - androgynadion; woman resembling man - feminine pseudohermaphrodite = hermaphrodite woman - gynandrodion. Mammary hypertrophy (gynacemastia) is found among the castrates, in pituitary insufficiency, hyperthyroidism and ovarian secretions. Pituitary insufficiency in the male is usually associated with the testicular insufficiency. With the decline of the testicular secretions, man has usually fatty breasts, abdomen and buttocks. With ovarian insufficiency viriloid symptoms sometimes appear in women. In slightly viriloid type with down on the corners of the upper lip, enlarged clitoris, there is greater libido and quick orgasm. But there is no inversion of the libido. However with cortico-suprarenal tumors, virilization with the appearance of hairs on the chin and the extremities of the limbs may appear with the involution of the genitals and the gonads. Man with the decrease of testicular secretions has the feminoid appearance. Beards begin to fall down almost like sunūchs. In castrates fat accumulates, is localized in the mammary hypogastric, peripelvic gluteal regions. Intersexual libido, a force of infinite organic and psychic complexity, is originally released by chemical hormonal product - testicular incretion in male, ovarian incretion in female. Interstitial tissue and its corresponding incretion may augment as a result of the atrophy of the germinal tissue. The homosexuals with inverse libido have either bisexuality of the gonads. It is also found among the sunūchs. Homosexuality may also be fixed by the conditional reflex through bad associates in boarding houses, army camps. They become intersexual when seductive women can awaken in them their natural libido. Ants and bees when they cannot secure females attack workers whose sexual organs are atrophied. In the fowl the right ovary, always atrophied, normally contains histological elements of testicular type which hypertrophy when the left ovary is extirpated. The testicular cells are the ovarian hilum. It seems therefore that testicular and ovarian cells and gonads are antagonistic to each

other. With the decline of the one, the other for the time being shows activation. Thus in elderly men there are signs of feminization, and during climacteric in women there is virilization. Ovotestis in the hermaphrodites may be bilateral or unilateral; it may exist on both sides or only on one side; or it may be alternating in which the gonad on one side is pure testicle and on the other pure ovary. Though these cases are very few and rare, yet these rareties illustrate the complexities and illuminate the dark by-paths of sexual perversions, inversions, transformations and sublimations. Women with deep voice, beard, peniform clitoris are often found with tumors of adrenals. Hyperactivity of adrenals seems to have masculinizing effect (Skt. *mushka* = Gk. *mushon*).

According to the Purāṇas, Manu (Cretan *Minos* = Egypt. *Menes* = Teut. *Manus* = Lat. *Manes* (the spirit of the dead) = Aa. *man* = Skt. *mānava*. *Brāhman* (prayer), *Brāhmana* (prayer-maker) = Lat. *flamines* (priests of the Romans; *flag*(men (who pray), *Falacer* (the name of one of the seven *flamines*) = Lat. *flagito* (who pacifies and prays) = Lat. *placeo* (to please, and suppliant = Gk. *pharmakon* (to bring helps, drug). So it seems in primitive Indo European society, priest and medicine man were combined to afford mental and physical relief. *Durja* is perhaps freedman of noble descent, *libertus* of Rome, whose grandchildren became entitled to full citizen's rights (*libertinus* = Gk. *apelletheros*) had nine sons and one daughter *Ila*. *Ila* gave birth to a son *Pururava* and later developed all the male characteristics (virile-scence: MBh. I: 75, 15-19). *Sikhandi* of *Pancāla* was an androgynodion - masculine pseudo-hermaphrodite. He had all the female characteristics in outward appearance as enlarged breasts and had no beard. But as his sex was uncertain he was brought up as a boy. He was even married to a *Dasarna* (= 10 forts; Central India. There is river *Dasan* in Bhopal) princess who to her great chagrin found out that her husband lacked penis and virility. It was communicated to her father who became enraged with *Drupada*, the father of *Sikhandi*, for having deceived him. Later *Sikhandi* developed male characteristics and virility. What appeared to be clitoris became erectile penis. The vulva contained enclosed testicles (MBh. 5, 191, 138). *Sthunākarna*, a *Yāsaka* (Yuechi or Yakut), a gynandrian, a

pseudo-hermaphrodite, who first appeared like a male, later developed all the female characteristics (MBh. 5, 194). Bhāṅgasvan (MBh. 13, 12), a king, turned into female with all the pronounced feminine characteristics and as a female had stronger libido than while as a male.

Kāmasūtra is the most important work on erotica of ancient India. It is ascribed to Mallanāga Vatsīyana. It is a compendium of previous works. It represents the philosophy of the sensualists who believed that after the acquirement of wealth (*artha*) and position (*dharma*), one should experience the pleasures of the senses (*kāma*) whose harmonious synthesis is the only real demonstrable joy in life. Svetaketu, son of Aruni Uddalaka of Madra, is said to have learnt the Philosophy of the Senses from Prayabana Jaivali of Pāncāla (= Krivis, Rv. 8, 20, 21, 22, 11; S. B. 13, 5, 4, 7), or he has independently profounded and established the sexual school of philosophy and eugenics, found in Brihad Aranyaka Upanishad. Svetaketu lived at the end of sixth century B. C. He also is the composer of Atharvavedic hymns. He regarded woman as the communal property for enjoyments (Ka. 1, 9). In MBh (1. 122) he is said to have established the system of marriage which did not exist before. The Aryans had regular marriage regulation. But the Madras and Karkatak Nāgas of Mahismati had free, if not, promiscuous unions (MBh. 2, 30). Bābhavya of Pāncāla wrote a book on sixtyfour kinds of sexual unions which has been condensed into Sāmpayogika, almost forming $\frac{1}{2}$ of Kāmasūtra. A Bābhavya Gālava of Pāncāla wrote Kramapatha of Rv. in Rik Pratishakhya. Pāncāla was also famous for 64 (*Ātub-sashti Pāncāliki*) arts, as well as for 5. Pāncāla was named, after 5 sons or clans of Daci Bhrimyaśva, Mudgala, Śrinjaya, Brihadieu, Yavinara, Kampilya. In Media king was called Dahyupati after the dominant Daci (Dabas, Chinese Ta-Hien) rulers. According to Bābhavya school, a woman's chastity is to be honoured and nonviolable if the number of her lovers did not exceed five. Pāncāli Draupadi had also five husbands, perhaps as their tribal custom. Among many Himalayan tribes with whom fraternal polyandry prevails, the wife enjoys the privilege of selecting her lovers, but not exceeding five, including her husbands. The national, town or village administration by five capables (*panca-*

five; *kā* = capable), that is, leaders (*pañcāyat*) as an institution was introduced by the Daci (*Dāsa* = Gk. *dakoi*) *Ājamidhas* = *Agamedes* = *Ājamāra* P. *Gangā* 4, 1, 151; *Diomedes* of Thrace = *Dvinidhas*. After the Thracian Medes, a class of the Daci, *Midim* and *Midas* were named). After *Babhravya*, there were seven other writers such as *Dattaka*, *Cārayana*, *Subarnanābha*, *Ghatākamukha*, *Gonardya* and *Gonikaputra*. *Cārāyana* was the commander-in-chief of *Birudaka*, son of *Prasenjit* of *Kosala*. *Prasenjit* was a contemporary of *Gotama* the Buddha, *Sisunāga* *Bimbisara* and his son *Ajatasatru* of *Magadha*, *Abhira* *Canda* *Pradyota* of *Ujjaini* and *Kuru* *Udayana* of *Vatsa* (*Kansembi*). *Arthashastra* mentions *Dīrgha* *Kāriyana* and *Ghotakamukha* which are *Kāmasutra*'s *Cārayana* and *Ghotakamukha*. *Kucumara* is mentioned as the author of *Aupanishadika* (secret medicine). A few sections of the *Aupanishadika* have been found in *Kacumāratantra* of about 10th century A. D. *Gonikaputra* is mentioned as a grammarian in *Patanjali*'s *Mahābhāṣya*. *Dattaka*, according to *Jayamangala*, a son of a Brahmin of *Mathurā*, was born in *Pataliputra*. He was adopted by a courtesan and he wrote a treatise, known as *Dattaka Sūtra*, on the ways and tricks of their profession. *Mādhavavarman* II, the ruler of the *Ganga* dynasty, wrote a *ṛitti* on it in 880 A. D. A fragment of it deals with *rakta* and *virakta* *vyayās* and *āyanopācara*. *Damodara Gupta* in 8th century A. D. in his *Kuttanimatam* quotes a *Sūtra* of *Dattaka*. *Subandhu*, a poet, a junior contemporary of *Bāna*, mentions *Mallanāga* as the author of *Kāmasūtra*. *Jayamangala* under *Viśāladeva* (1243-61) wrote its *Yasodhara* commentary.

Kāmasūtra mentions that when a maiden seems to be inclined to accept a love proposal, the stories of *Abalyā*, *Avimāraka* and *Sakuntalā* should be told. *Abalyā*'s love affair with *Indra* is depicted in *Rāmāyana* and in *Purāṇas*. *Avimāraka* (sheep-killer) is a six act play of *Bhāsa*; *Viśvānubhāsa* was given this title affectionately by *Saṅgaviśa*. *Avimāraka*, a *Candāla*, reasoned princess *Kurāṅgi*, daughter of *Kuntibhoja*, and *Kurāṅgi* fell madly in love with *Avimāraka*. *Sakuntalā*'s story is found in *MBh*, *Purāṇas* and in *Kālidāsa*'s drama. *Kālidāsa* seems to be acquainted with *Kāmasūtra*. In his *Abhijñāna* *Sakuntalā* (4, 5) the instructions as to the duties of the wife are similar to

Kāmasūtra's Bharyādhikārika 3, 16. When during the marriage ceremony Aja clasped the hands of Indumatī, Indumatī's fingers perspired (right indication) and the hair on Aja's forearm had horripilation, which Mallinatha says was borrowed from Kāmasūtra, and in Kāmasūtra they are described as indications of sexual excitement. In describing the amorous dalliance of Agnivarman (*Ragātomanā* 19), Kālidāsa uses the technical term Kāmasūtra's Sandhaya in Vesitāpratisandhaya. Dūsmanta in act 5 of *Sakuntalā* is made to say Nāgaraka Vṛittyā in the technical sense used in Kāmasūtra's Nāgarakvṛittam. Kāmasūtra (6, 7, 26-8) mentions that Śātavahana Kuntala Śātakarni (206-214) in his sadistic lust killed his queen Māyavati by a blow on her head (kartaki). Abhira Kottarāja, ruler of Kotta in Gujarat, was killed by a washerman employed by his brother who had claim to the throne when he had gone to Vasumptra's house to meet his wife with whom he had intimacy. Mahākshatrapa Isvaradatta's (son of Abhira Śivadatta) coins show that he ruled between 188-190 A. D., that he conquered Mahārāstra from Śātavāhanas. According to Purāṇas Abhira ruled Avanti and Saurāstra. In chapter Isvara Kamita (sexual pleasures of rulers) whether Isvara has been used after the Abhira Isvara Datta or for rulers generally, any way, the rulers of Aparantaka, Vaidarbha, Saurāstrakas, and the Andhras are mentioned. This shows that the Andhras have lost their suzerainty, and petty Saka and Abhira states have developed in Western India, and Andhra domination only existed in South Indian Andhra proper, and the Guptas have not yet begun to wield imperial sway over Western India.

Mallas (Mallot of the Greeks) were found in the Multan area which was their capital after their name. In second century B. C. they migrated to their new homes—Karkata Nagara in Jaypur via Bhatinda state, leaving their trace of existence in Malwai dialect, extending from Ferozpur to Bhatinda. Karkata Nāgas (Kara Kirghiz) and Mallas (Mālas, Mālaya, Malva) were identical peoples; Pahlavas and Kshudrakas were their allied kinsmen. They had already settled in Malva which was named after them. The Malla coins had their tribal name, Malla, Mālaya or Malava inscribed on them, and they bore the symbols of a standing lion, a humped bull and a

fantail peacock. Karkata (Karkitai—Kara Kirghiz—Kirata) dynasty was the most ancient and very powerful imperial dynasty of Kashmir, producing Lalitāditya; Karkata Nagas in Mahismati in lower Narmada (MBh. 2, 30) where their women were not bound by marriage laws; Mallas in Kusinagara and Pāvā. It is not unlikely that Malabar, Marawar and even Malaya Peninsula, have been named after the Mallas. Malla Nāga Vātsayana (of Vatsa Gotra = Vatsi and Gargis were Sungas mentioned in Barhut inscription) was Malla of Karkata Nagara, and his *nagaraka* meant a leading citizen of Karkata Nagara. Bakataka, Nava, Vidisa, Barasiva = Varasikha (Rv. 7, 3, 7.) = Borasii = Borossians = Prussians and Bhogin Nagas belonged to the Sesa Naga (Sisunāga—Susināga = Hsiengnu = mixed Alpine) tribe. Between the third and fifth century A. D. Vakataka and Barasiva Nagas held dominant positions in upper and central India and in Gangetic doab. Mahesvara Nāga, son of Nāgabhatta, is found in Lahore copper seal inscription. Chandrāma, the second Nakhavantī, is likely the Chandra of Delhi Iron Pillar inscription. Bhava Nagas (Pravara Sena) of the Barasivas were *besprinkled on their forehead with the pure water of the Bhagirathi* that had been obtained by their valour which is still commemorated by the Dasāsvamedha Ghāta of Brānāsī where they performed ten (dasa) Asvamedhas (horse sacrifices). Chandragupta II Vikramāditya 385-415 A. D.) in order to secure his position sought alliance with the Bhava Nagas and asked for the daughter of Rudrasena I, and married his daughter Kuveranāga. The Bakataka, Barasiva and Nava Nagas styled themselves as Dvija Brahmins. It is very likely that Nagara Brahmins of Gujarat and Bulandshahr (Jat Nagre many of whom have been now Moslem converts) were Malla Nagas. As the Nagas were city dwellers for administrative purposes, *Nagara*—has been called after them. They introduced *Nagari* script and Nagara style of architecture, consisting of a four-sided pinnacle (sikharā) on a square body. For their toppish style of living and loose sexual morals, Nāgara has become synonymous with bean. Vidisa Nagas trace their descent from Sesa (110-90 B. C.). Bhogin (80-60 B. C.), Rasmachandra (80-50 B. C.), Dharmavarman (50-40 B. C.), Vangara (40-30 B. C.) have on their coins and architectural monuments serpent coils.

Samudragupta expanded his kingdom at the expense of Barasiva Nāgas, by defeating the allied armies of Gaṇapati Naga, ruler of Malava (Dharadessa) and Vidisa (Berar); Padmavati, its capital; Nāgasena of Mathura; Achyuta Nandi of Abichatra (Bamnagar in Berilly Dt.); Brarasivas of Kantipuri (Kantil near Vindhya-chalam where Vindhyska ruler Vindyasakti 238-284 A. D. established Vindhya-vasini temple) and Nava Nāga Guhas of Kalinga. Vakataka rock inscriptions have been found in Ajanta and at Maunsar. Vakatakas favored. Saivism. Vakataka carved stone fragments show them with brachycephalic head with long combed hair, high bridged long thin nose, long brows, shaven oval face, but somewhat thick lips and gazelle eyes. Andhras were also of Sesa Nāga (Sisuka) descent. Sesodia (Sesa origin) dynasty claimed also to be Nāgar Brahmins. Bappa Rewal 758 A. D. of Guilot belonged to Maitraka Vahlabbis who were Nāgara Brahmins. In Ekalinga Mahātmya composed during the reign of Rāṇā Kumbha it is mentioned that Guha Datta (Guilot; Nava Nāga Guhas of Kalinga; Abhir Sen-Dattas. Datta a subtitle of Nāgar Brahmins) belonged to a Brahmin family from Anandapura. And Vijaya Datta, ancestor of Guha Datta, was the ornament of the Nāgar race. The Goṭra of Guilot Rānas was Vajjavapa which is a goṭra of the Nāgars, proved by the Prasasti of Nanaka from Kodinar in Baroda. Bengal Kāyasthas, among whom still Alpine traits are dominant, have the sub-titles of the Nāgars. Nayars of Malayalam (the abode of Mallas) and Newars of Nepal are likely to be the corrupted forms of Nāgar as *Kusinagara* was called in Pali Kusinar. From Mahismati Karkata Nāgas might have gone further south. Or Nayars may be a branch of Pallava Malla who dominated the south from 3-7 century A. D. There is Nāgar-coil (covil=shrine) near Cape Comorin. All Nayar houses have snake shrines. Though mixed with the Australoids from whom Nayars have matrilineal Terawad and with Namabbutris, Nayars show brachycephalic head with fine nose and refined features. Nayar women had the freedom to select their lovers. And their lovers constituted their polyandrous unions. From 496-880 A. D. Licchavis ruled Nepal. Mallas of Kusinara raided Nepal with Licchavis as Mallas are mentioned in a pillar by Licchavi Maṇa Deva. A Malla of Patan founded

Champagnon in 991 A. D. Mallas (Suryavamsi Mallas, ancestors of Newars) ruled Nepal from 10th century up to 1767 when Jayprakash Malla was ousted by Prithivi Nārāyan of Sesodiya clan who settled in Gurkha territory from Chitor, forced by Turkish conquests, and organized the Mongoloid Gurkhas into a fighting force. Sesodiya domination with the Gurkhas was facilitated by Yaksha Malla who in 1480 divided Nepal into 4 parts, and he gave Bhatgaon to his eldest son, Benepa to his second son Rana Malla, Kathamunda to his third son Ratna Malla, and Patan to his daughter. Gurkha, Furunga, Magars are Mongoloids, but slightly mixed and overlaid upon the Australoid early occupiers. Then the Khasas whose language still persists in Khaspura. Kirātas also ruled in Kathamunda. Kirāntis are found, sometimes mixed with Yakha (Yaksha-Yuechi). Kirāntis (Kitans) used to take beef for which reason Sesodiya Prithivi Nārāyan and his Rajput Thakurs fought them, brought them under submission. Among the Kirāntis, intermarriage between cousins for three generations and marriage within the same clan are forbidden. But though Kirānti women are generally faithful to their husbands as long as they live with them, they usually run away with any man of cognate clan. Mahārāstra Kabaharata was of Kirāta (Kitan) tribe. They penetrated up to the Vindhyas and even Deccan. Newars are the mixed remnants of Karkata Naga Mallas. Karkata is still venerated by all Newars. Newar girl is married to a vilva (Aegle marmelos) fruit. As vilva is found in all seasons, so a Newar girl can never be a widow. Divorce is easy for a Newar wife. A dissatisfied wife had merely to place two betel nuts in her husband's bed and go away a free woman. Morals are not strict. A Malla princess (Mallikā) married to Prasenjit of Kosalā (Khas; Khos of Chitral; Kash of Kashmir; Khas of Sub-Himalayas) is accused in Dhammapad Attha Kathā (XI, 5) of gratifying her lust in sexual congress with her pet dog. On the Caspian steppe there is a *Nogair* (= Nagara) Tartar tribe. Malla Karkata Nāgas (Kara Kitai) are likely to be Kara-Kirghiz Tartars. Siddha Cakravarti Avantinātha Jayasinga of Patan of Chalukya dynasty after his conquest of Mālava made *Nagara* Mahadeva, son of his chief *Brahma* minister Dādaka of Anandapur, governor of Ujjaini in 1138 A. D. Pārthavas = Pehlavas = Pallavas = Pallava-Mallas =

Jay Pāla of Sāhi Dynasty—Pāla Dynasty of Bengal (represented at present by Suvarnavanīa (gold merchants) Pāla—Pālis (who claim Kulasekhara Varman Alvar (825-850), one of the early kings of Travancore, whom inscriptions reveal as a Pallava and celebrate his anniversary at the Partha Sārathi temple he built in Madras City. Pālis are also the priests of Draupadi temple of S. Arcot) = Vellalas (Pillus) = Guha Vellalas = Carakbat or Karkata (Nāga) Vellalas = (Billana-varu = bowmen, Bhila) = Malaialia (Malla) = Billavas (Illavans = Izhuvars) = Hoysala Ballals (in German language *w* is pronounced as *v*, *v* as *f*, *f* as *p*; in Dravira, similar phonetic transformations are evident) who conquered Orissa, Bengal, and settled there as Sena Dynasty after Saiyua Baidya of Billavas and known in Bengal as Baidyas. Saiyua Baidyas of Billavas officiate as priests at Bhūtāsanas (Bhuta shrines). Okka Ballala on horse back is represented as a Bhuta (Bhota = Tibetan). Bhuta, Preta and Pisāca are also given as names of Billavas. Like the Tibetans they are all polyandrous. They are all Sakti and Nāga worshippers. Sakti is a naked woman. Male worshippers are called Bhairavas and female worshippers Nayikas. The ingredients of worship are cooked fish (matsya), meat (māmsa), toddy (mada = liquor), mudrā (excitation of the clitoris through the raised forefinger, other fingers being closed) and then promiscuous copulations (maithunas). Their cakra, a symbolic chart, also represents polyandrous unions. Kānya Kumāri (Virgin maiden) statue near Nagarcoll (Nāga shrine) is also nude and which is worshipped by a naked priest. Nambhutiri women puff off their hair locks with black yak tail, in place of any false hair. Yaks are only found in Tibetan high regions. It indicates that Nambhutiris, the priests of Nayars, brought that fashion of hair dressing from Tibet. Temples with gabled or multiple roofs are common in Newar and Nayar temples. Every Nayar house has a snake shrine, representing on a stone two coiled snakes in sexual union. This snake shrine is called in Telugu *Mancha* where the conquering Ballals introduced the worship. Ballala Senas introduced the Sakti (including Durgā) and snake worship *Manasā* (- Manchā) in Bengal. Chandras (Viriscandra 976-1000) of E. N. Bengal of Ratnagiri (Comilla) of Kamboja origin who conquering the lower

deltaic area (in Backergunj) called it Candradvipa and who had great trading vessels (*sapta dingī*) opposed its introduction, described in Manasa Mangala whose snake shrine (*Manasā bari*) of Vijaya Gupta of Goila is still a pilgrimage. So Malla Naga represented the sexual life of the Nāga India, particularly of Nāgara, about fourth century A. D. just before the Guptas brought the entire northern and especially western India under their imperial control and centralized administration. Andhra dynasty will be established by Sank (*Sasa Naga*). Thirty Andhra sovereigns will rule for 456 years. Then there will be seven Abhira (*Avars*) and ten Gardhavila (*Saka*) kings, to be followed by 16 Saka rulers. After them Yavana kings ; 14 Tukhara. (*Egypt Tsakkaras* who with *Palaesti* - *Philistine*), an allied clan, wearing short tunic and plumed cap, were defeated by *Ramasas II* in 190, B. C. in Syria (*Sari-Sura*) and 13 Mundas and 11 Marundas. Then will rule *Kaitakila* Yavanas of whom *Vindhyasakti* will be their chief sovereign. After *Vindhyasakti* will be *Furanjaya*, *Ramacandra*, *Dharma*, *Varanga* *Kritsanandana*, succeeded by *Susinandi*, *Nandiyasa*, *Sisaka*, *Prevari*. After ten *Bahlikas* (*Greco-Bactrians*) ; *Puspamitras* (*Parumitra*, *Sumitra*, 13 in number of *Kidara* or *Kitan* tribe). *Kaivartas*, *Kitas* (*Kitans*) and *Palindas*, *Palindaka*, sixth Sunga monarch, *Vishnu P.* Sunga clan, later mixed with the *Bhills* of upper *Vindhyas*. At *Padmapuri* will rule *Nava Nagas*. At *Kantipuri* near *Prayag* and the *Gangā* will rule the *Magadha* (*Trans-Oxania* in *Sakadvipa*) and *Guptas* (*Vishnu P.* 4, 12-18). After the *Andhras*, *Abhiras* will rule ; *Gardhavabhila* ; *Sakas* ; *Yavanas* ; *Tusharas* (*Tocharis* ; *Tajiks* - *Yaksha* - *Bākshasha*) ; *Marunda* *Brisala* (*Barsileens* of *Ptolemy*, *Geog.* 5, 9 ; *Scythian Basiles* - *Ephthalite* - *Yotba* - *Vetala* - *Veta* in *Kangrā* - *Vetasa* (*Rv.* 6. 24. 4) - *Varasikha* (*Rv.* 7. 8.3) - *Borossi* - *Borossians* - *Prussians*. *Andhras* will be conquered by *Sri Pārvasiyas* (*Guptas*) and *Abhiras*, and *Kilakila* *Yavanas* (*Matsya P.* 273, 16-21). *Andhras* will rule in five dynasties. They will be succeeded by *Abhi as*, *Sakas*, *Yavanas*, *Tukharas*, *Marundas*, *Maunas* (*Madas*) ; *Kalakila* *Brisalas* (*Barsileens*), from whom *Vindhyasakti* will conquer the territory. *Bhagin* of *Sasa Nāga* descent will rule *Vidisa* ; after him *Śaḍācandra*, *Candrāmasa*,

Nakhavan; Vindhyaśaktis; Bhalikas; Pushyarnitree; Meghas, descendants of Nishada Nalas. After them Māgadhas; Nava Nāgas in Champavati, and Nāgas in Mathurā. Later the Guptas will rule in Prayāg region, Saketa and Māgadha (Vāyṇ P. 99, 369—384). Malla Nāgas (known as Māls) settled in N. Bengal, after whom it was called Mallabhumī—Mālbhum (including Vishnupur). It is likely that from these Nāgas, Naga subtitle of the names have been derived; Guha from the Saka-Guhakas; Gupta from the Copt Gyptos, Datta (Abhira Isvara Datta; Ghosha from Abhira Ghoshas; Nandi from Chude Nandas. Parthians (pehlavis) adopted the Greek customs and manners. That Pehlavis and Pallavas are the same people is corroborated by an epigraph in the Vaikuntha Perimal temple at Conjeeveram in which it is mentioned that Paramasvara Varman (Nandivarman in 8th century A. D.) of a collateral line is offered a crown (mukuta) in the shape of an elephant's scalp which was the fashionable helmet of Alexander's successors as symbol of power like the Ptolemy I of Egypt, Agathocles of Syracuse, Antiochus IV, Lycias, Demetrius of Bactro-India. Pahlavis imitated the Greek fashion. And Androgoros, satrap of Parthia, adopted such a headdress. In Jātakas the marriageable age of girls is sixteen (328 *Amra J.*). Girls remained unmarried without being able to secure husbands of their choice up to the age 20, 25, 29 (344 *Amracora J.*). A Jaina monk and a nun were married at Vaisali. They had one son and four daughters. The daughters after finishing their education proclaimed that if they were defeated by a householder in a philosophical debate and discussion, they will marry him; if by a monk, they will be nuns of his order. Thus they used to travel from town to town. They were defeated by Sāriputra at Srāvastī and they became Buddhist nuns (301 *Khulla Kalinga J.*). Father tempts his unmarried adolescent girl (103, 217 *Pavika J.*). Divorce and widow marriages were known. Sivi king became infatuated with Unmadayanti, the wife of his commander-in-chief Ahiparaka. Ahiparaka divorced his wife so that the king could marry her (527 *Unmadayanti J.*). A priest married a widowed queen (411 *Susima J.*). It was the custom of the Mallas of Kusinagara that if a Malla wife was barren, she was allowed promiscuous intercourse to secure a child. The

Malla prince was married to a very pretty Madra princess Prabhāvatī. Mallas did not allow their wives to look at them in broad day light before they have given birth to a child like the Dorians of Sparta. Prabhāvatī finding her husband not good-looking left him, thinking she could marry somebody else of her choice. Madra (Maruṇḍa = Saka), Uttara Kuru women were noted for their beauty (591 *Kusa J*). Kinnaras (Cimmerians) wore embroidered dresses; they were fond of music and dances; and their unions were based on romantic love and attachments (411 *Candra Kinnara*, 604 *Bhātālīka J*). Sakyas used to marry their own sisters (586 *Kumala J*) like the Achaemenides. There were drinking festivals (*suratsava*: 518 *Kumbha J*). At Srāvastī men and women indulged in heavy drinking like the Bacchanalia in Greece, Saturnalia in Italy and there were to a certain extent free unions. After finishing one's education and securing the means of livelihood either by army career (*jaya*), trade (*kṛaya*), by employment (*nīrassa*) or by bequests (*prati-grāha*) at the age of thirty one should select a maiden of equal status, 3 to 5 years younger than him. Man reaches the plenitude of manhood and virility between the age of 30-35 before which he does not attain physical and mental maturity; and a woman reaches the glory of her womanhood between the age of 23-25. Female puberty is attained a few years earlier than males. Before this age sexual union is not only injurious to the health and vitality of the married couple, but is also degenerating to the race. It is only among the peoples like the Scandinavians, Germans and Anglo-Saxons where sexual abstinence is the general rule during puberty, and men do not marry before 30-35 and women between 25-28, best specimens of men and women in physical health, nervous vitality and intellectual resourcefulness are found. Peoples like the Chinese and the Hindus who practise early marriages are physically weak and intellectually backward. The Moslems who idealize sexuality as an expression of their virility, a kind of prayer to their creator by displaying his creative energy, and indulge in sexual excesses through their polygamous practice and mentality are degenerating. It is the activation of the interstitial calls of the gonads and their corresponding hormonal incursions that develop and preserve health, vigour,

vitality, longevity and intelligence. Its activation is in inverse proportion to reproductive and generative exercises and functioning. Among the Oceanians, Polynesians, Negro, Amerinds, Austrians, Negritos, with whom even prepubertal promiscuity is tolerated, though conception may be tabooed, not only race vitality is low as they are fast dying out, the culture is also at the lowest stage of savagery. Culture and civilization are based on self-control and co-operation. Masturbation is more injurious morally than physically as in this lonely relaxation, one can dissipate his energy without the co-operation of a companion which requires some thinking and display of some energy. If a person before the attainment of his full physical maturity fritters away his sexual impulsion, he as well as the society that permits it as a custom cannot develop the physical, intellectual and racial creative and expansive urge and energy which are the inflorescences of sex hormonal integration. The peoples whose standard of hygiene and nutrition, especially in animal protein, are not high, do not have the intense sexual tension of the modern well-nourished peoples, and therefore their sexual needs are limited, and they have few sexual perversions. The terms used for generative organs and for coition were generally of Indo-European origin. *Yoni* (Rv. X, 10.7) is the name of the female generative organ. *Yoni* is the most delightful of delights (*priyasya yonishu priyah san* X, 123. 5). *Yoni-nisā* = clitoris. Gk. *gyna*. Dorian *gynē* mean both female generative organs and woman. Gk. *genaw* - to generate either male or female. Gk. *genos* Lat. *gens*, plu *gentes* mean the relations in descending line up to grandchildren, and in ascending line as father, grandfather and collateral relations. It is the Hindu *gnāti* - Lat. *gentes*. *Yoni* - Gk. *gynē* - Lat. *cunus* - Fr. *con*. 'Skt. *Bhaga* - Lat. *Vagina*. Originally the children were the *gens* of their own mother; while the husbands of her daughters and wives of her sons belonged to several *gentes* (Skt. *gnāti*) - kinsmen, known peoples. Skt. *kam* and *kan* - to desire, to enjoy; *kāminī*, *kani*, *kanyā*; Av. *kainyo* - desired, maiden; *cunni* - Polish *kuwa* - Ger. *hure* - whore. Lat. *cunnae* - cradle. *Bhadda* (Rv. p. 112. 4), Beng. *bhoda*, Lat. *fendo* - Fr. *fente* (fissure); √Skt. *bhāḍ* (to pierce, to cleave - Hind. *phāṭan*), Lat. *find*, Gk. *phaid*, Ger. *schnaid-en*.

Snathitha vaitasena (Rv. X, 25, 4) = pierced by a reed (*vaitasa*) = coition with a vital, that is, virile organ. Reed with its round hollow stem has been compared with the round erect penis with its central urinal and seminal passage. *Vetasa* = Lat. *vita*, Gk. *biote*, Fr. *vit*, which in their languages also mean animated action from which *vitality* is the Eng. expression. *Sepa romantsantau bhadrau* (Rv. 9, 112, 4) : penis (*sepa*) searches for hairy vulva (*vedha* = cleft). *Sepa* = Lat. *cipus* or *cippus*, meaning a stake, cognate with *scipior*, Gk. *skeptō*, stuff. Lat. *virga* = Fr. *verge* means both rod and penis. It has originated from Lat. *vir* = husband, *virilis* = virile power. Skt. *vira* = a husband (MBh); *virya* = semen and virile power = Lat. *virga*, Fr. *verge*. Skt. *mehana* = Lat. *mentula*. Skt. *punsa* = Lat. *penis* = Fr. *pine* = Gk. *peos*, Skt. *punśiva* = virility, semen. Skt. *sisa* = tail or penis. *√anath* = to pierce. *Sushi* = a cleft that sucks (semen). *Sushma* (Av. 9, 1, 10; 20) = sexual energy; virile semen. *Susba* = to procreate, vital energy; *√svi* = to swell (the turgescence of penis); *Seavate* = to swell much. *Sush* to bring forth a child. *Sushana* = female genital; *susha* = a parturient woman; *susha* = vigor; *sushas* = one who enjoys. These are cognate with Gk. *kysos* or *kythos*, a term for a cranny, especially vulva. Gk. *pycos* or *pythos* = Lat. *puendum* (with putrid stink = Skt. *puti*; Hind. *pond*, both anus and vulva, cognate with Skt. *vallabha* which means *desired* and *beloved*. Lat. *coitus* = Fr. *coit* = Skt. *cuda* = *coda* (Rv. 1, 148, 6; 2, 13, 9), *codana* (Av. 7, 116, 1) and *codana-mati* (Rv. 5, 8, 6; 8, 46, 19) = inclined to coition; *cuti* = vulva. Skt. *ramana*; *ram* = delight, love; *rati* = pleasure, passion. Gk. *eros* = love. Lith. *razmas*, *rimti* = relaxation. Skt. *mithuna* (sexual union) = Lat. *mutu-us* (mutual) = Gk. *mignemi* (mingling). Lat. *venereus*, *ueneri* = Fr. *venerian* = Eng. *venery*, *venereal*, *veneration* = *vaned* (Rv. 2, 4, 5), *vanana* (Rv. 9, 86, 4) = ardent desire from *√van* = to desire, Eng. *win*, Ger. *ge-winnen*) = Skt. *vanita* (desired), *vanita* (beloved wife or mistress). Skt. *bhānu* (a ray of light, lustre) = Lat. *Venus* (planet); a handsome wife = *Venus*, goddess of love and fertility. Jyotirevara's *Pancasāyaka* describes four racial types of men and women after *Vātsīyana*, different coital postures and some aphrodisiacs. *Kokkoka*, son of *Tejaka* and grandson of

Paribhadra, wrote his *Ratirahasya* in ten chapters for the pleasure of Vinayadatta in elegant verse, possibly in 12th century. Padmasri, a Buddhist monk, wrote *Nāgarasaurva* in 18 parts, describing various phases of love and their emotional ecstasies. Padmasri mentions Kūnimata and is quoted by Sarangadharapaddati, and therefore he is likely to have lived before 1000 A. D. Harihara, son of Kamavidvat, wrote *Rati Rahasya* for which he got a large amount of money from Arjuna Varman of Malava in early 13th century. Harihara, son of Candra, wrote *Rati Darpana*. Immadi Praudhadevaraya, king of Vijayanagara (1422-48), wrote *Rati Ratna Pradipika* in seven chapters into the passions and refinements of amorous sports. Ananta wrote *Kamasamuha* in 1467 A. D. describing the seasons, types and temperaments of women and the different phases of love. Kalyāṇamalla (also of Malla descent) wrote in 16th century *Anangaranga* for the pleasure of Oudh ruler Ladakhan Lodi, son of Ahmedkhan Lodi, viceroy of Guzerat. In ten chapters he describes various types of women, 32 copulative postures and their sensual pleasures. Virabhadradeva, son of Ramchandra, a king of Vegela Salivahan dynasty wrote in 1577 *Kandarpa Curāmani* in verse. Mīnanātha wrote *Smṛtadipika* in 167 verses. *Ratimanjari* of Nayadeva is a small poem on woman and amorous pleasures. In an Egyptian papyrus of about 1800 B. C. now in Turin, fourteen different positions are represented. "One must practice continence during educational career which should last one-third of one's life of 100 years that is 33 years and 4 months (Ka. 2.6). Sensual passion destroys even powerful men with their family. In *Dandaka Bhoja* (Satvata) was ruined for ravishing a Brahmin girl; Indra for the sake of Ahalya; powerful Kicaka for the sake of Draupadi; Ravana for Sita (Ka. 2.34-36). After finishing studies of sacred literature (*dharma*) and acquired vocational training (*artha vidya*), one may learn fine arts and sexology (Ka. 1, 3, 1). The bride may learn the principles of sensual arts from the married daughter of her nurse, a girl friend, maternal cousin, an old female slave or Bhikauki or sister (Ka. 1, 3, 13). Sensual arts consist of singing (*gitam*), music (*vādyam*), painting (*lekhyā*), the use of facial cosmetics; religious altar decoration with flowers, incense and rice powder;

arranging flowers for parlour and bedrooms; cosmetics; costumes; garland-making; hair dressing; making earrings; perfumes; harmony of ornaments; the art of dressing and cosmetics by which one can appear more beautiful than she really is; cooking; sewing; swimming; making music by striking on water-filled cups; spinning; writing poems; writing dramas; acting in dramatic plays; literary criticism; wicker basket and chair making; carpentry; joining wooden beds; planning of a house; identification of minerals; chemical knowledge of salts (*dhātavaḍa*); knowledge of precious stones; to exhibit ram and cock fighting for entertaining guests; horticulture and agriculture; teaching parrots talking; massaging; communication through code symbols; double-meaning expressions; foreign languages; show of sentiments through arrangement of flowers or by their presentation; water or sand clock making; memory culture; setting tune to songs; development of thinking power; composing poems; knowledge of dictionaries, meters, metaphors, and synonyms; the art of dressing so that old or torn out clothes are not shown; dice playing; doll making; learning manner and behavior; self-defence; physical culture. These 64 arts are known as *Pāncālīkī*, for they were developed in Pāncāla. With the acquirement of these, a common prostitute (*śeṣyā*) can become a courtesan (*ganikā*), respected even by kings. A princess or high officer's daughter with these arts can bring her husband under control even if he had a thousand other inmates. In case the husband dies or there is economic distress due to his being addicted to gambling or vice or is compelled to go abroad, or if circumstances force her, with her knowledge everywhere, she can earn her living independently under all conditions (*Ra* 1, 8, 16). After finishing his education, he will acquire wealth and earn his living either through inheritance, military career, trade or professional service, and settle up as a *Nagaraika* either in city (*nagara*), port (*pattana*), town or pleasant country place. There he will build his dwelling (*śaṭana*) near a lake and an orchard. His dwelling should have two rooms (*kakṣā*). In the drawing room, there shall be two fine pillows, on a bed spread over with a white sheet. There shall be a bed near it. In front

shall be a low table with a painting materials and canvas. On other table there shall be perfumery and cosmetic boxes, garlands, orange skins and betels (*tambaka*). On the floor there shall be a sputum, a violin with ivory keys, a painting stand, painting materials, a few books, flower stand and garlands. A chair, a dicing board. Outside there will bird-cages, a dancing and singing parlour. One swing with a soft seat under the shade of a large tree. One raised polished platform under a flowering bower (*Ka. 1, 2, 3-4*). Getting up early in the morning he will evacuate his bowels ; then cleanse his teeth, use some cosmetics ; take the fume (of the resin of *Cannabis sativa* and chew it for its exhilarative effect) ; wear garlands ; rouging the lips and cheeks with lac dye and then rubbing them with a pad (*sikth alakram*), will look himself in a mirror ; and then taking betel with some spices will begin working (*1, 4, 5*). He will take his daily bath ; every second day rub the body with oil ; every third day cleanse the body with phenaka (*soufnut* = *Spindus mukorossi* and *laurifolius*). Shave his beard every fourth day ; shave his pubic hairs (*pratyayushya* : pubic hairs of the ladies were shaved as a sexual hygienic measure as in China, ancient Greece and Rome ; Turkish women use a depilatory) every fifth day ; hair of the axillæ every tenth day ; whenever desired, in a closed room, perspiring bath (*sambrita kaksha seedaponoda* — Lat. *sudaria*, sweat bath in which profuse perspiration is induced in a superheated room after which the body is washed, rubbed and kneaded ; it relieves the kidney). Meals are to be taken in the morning and afternoon, according to *Grāyasa* in the evening. Then some art culture. Later the body is to be massaged. Finally dressing the hair with cosmetics, one should go out in the afternoon to the club (*goshti vihāra* : *Ka. 1, 4, 5*). He will attend theatrical shows (*ghata nivandhanam*), clubs (*goshti*), sometimes even in the houses of courtesans where philosophical literary and art discussions took place like the Gr. philosophers, and artists in the gardens of betaræ, samapanaken (drinking parties in the houses of mutual friends) ; excursions to parks and picnics (*udyaṇa gamanam*) ; collective plays and dances (*samasyā krīda*). Fortnightly, monthly or on festival days in the temple hall of Sarasvati there will be regular social

gatherings (*Samsajās*; *Samsaja* is an old institution from Vedic times. It was attended with wives and children. In the *Samsajās*, plays were enacted, dances displayed, songs sung with music, and sports played by the members themselves for mutual entertainments and social pleasures. Much meat and drinks were consumed. Asoka forbade the slaughter of animals to supply meat for these social feasts. Here social acquaintances were made, new friendships formed, old friendships renewed, in the midst of general merriments. Every one tried to appear in his or her best. Youths courted maidens. Both made love to each other. And mothers tried to fish them in marriage nets). If strolling actors and actresses (*kusilāras*) came, they were allowed to show their talents and were rewarded (Ka. 1, 4, 7).

"By marrying a girl legally of equal status (*savarṇā*), who has not been betrothed to anyone else one acquires influence, wealth, relatives, progeny with genuine sensual pleasures (Ka. 2, 1, 1). The bridegroom should be 53 (*Manu* 24 : 9, 94). The bride should be three years younger than him (Ka. 2, 1, 2). *Vālā* in Skt. did not originally mean a girl, but having pubic hair (*vāla*). *Vāleśvara* or *Baleśvara* (*Bāl*) was the Phallus of Siva which was used to fracture the hymen of adolescent brides having pubic hair (*vāla*) as in ancient Rome brides were offered to Priapus for defloration; *Vāleśvara* temple in Tiru-Vāleśvaram. One should select associates, friends, playmates, wife from families of the same status, not of superior or inferior kind (Ka. 2, 1, 15). Neither it is good that husband should be treated like a servant by his wife, nor husband should lord over his wife and treat his father-in-law, brother-in-laws and other relatives as inferior beings; the wise should avoid both these high and low marriages (Ka. 2, 1, 18-19). Approach your wife for intimate relation, by creating confidence in her and rousing her emotions and senses and not by force. Women are like flowers. Like flowers treat them gently. If you try to rape her without rousing her inclinations, she shall always remain frigid towards you. Awaken her by affection, friendship and caresses (Ka. 2, 1, 5-6). Of all marriages, marriage by mutual selection (*gandharyā*) is the best, as it is based on mutual love (Ka. 2, 5, 13). Wife should keep home neat and clean. The room should be decorated with flowers.

The floors should be even and pleasant looking; she shall present herself thrice to the temple. She shall treat the elders, sisters-in-laws and servants as the husband wants. She shall raise different kinds of vegetables and make flowery bowers. Flowering plants shall be many. A well and a lake will be dug out. She shall not associate with *Vikshubis*, *Sramanas*, *Kshapanas* or loose women. Foods that are agreeable, and appetizing and suitable to her husband, shall be made ready. When she hears the footstep that her husband is returning home, she shall hurry up to the porch to greet and welcome him. With the consent of her husband, she shall go to marriage festivals houses of her female friends, clubs or temples (Ka. 3, 1, 1-16). From the unused milks, she shall have butter made; from mustards, oil; from sugarcane *gura*. From cotton, threads should be spun and clothes woven. Food should be given to the slaves, cattle and sheep. She shall pay the salaries to the servants and supply them provisions. She shall supervise the plowing and sowing of fields plantations of orchards, grazing of cattle. She shall keep an account of the income and expenditure. That is her daily routine work. She shall make an annual or half annual budget of her expenditure according to her income (Ka. 3, 1, 81-83). She shall greet her husband's friends with the presentation of garlands, scents and perfumes. She shall attend on the father-in-law and mother-in-law. She shall secretly keep her stores of wines, and purchase them according to her needs; and salt, oils, medicines, pickles, vinegar and perfumes which are not always available. She shall collect in time and store seeds of grains, vegetables, onions, garlic, and herbs. She shall remove her perspiration, keep her teeth always clean, otherwise it may give unpleasant sensation to her husband (Ka. 3, 1, 23-8). It was the duty of the husband to gratify his wife's amorous rut (Skt. *ritu* = Lith. *ruja* = Lat. *ruji* = turgescence of the vulva = Fr. *rujir* = Eng. *rut*; though ovulation takes place on the fifteenth day before (11-15 day after in an adolescent female of 28 days regular cycle) the onset of menstruation, 16 days (Manu 3, 46-47) ending the menstrual affluva were regarded as the *Ritu* (*rut*) period, as the subsiding turgescence and consequent increased vaginal secretions not only facilitate penile intromission, but add also sensory pleasures. And if any grown up maiden

had no husband, she could ask anyone she pleased to satisfy her sexual urge at that period, and it was his bounden duty and religious obligation to perform this pleasant task. In MBh and Purāṇas we find that women took full advantage of the liberty of the sexual selection and enjoyment thus given to them. From the 12th to 15th day—the ovulation period—not only there are powerful sexual urges due to the follicular secretion with the escape of the egg which also contains *estrogen*, the rutting hormone, starting growth in uterus, vagina and mammary glands; they were also regarded as favorable for conception. But copulation was forbidden during the first 4 days of menstrual efflux, as in many ancient countries. Sadism was prevalent, especially in the south. Andhra Kuntala Svaticarna (208-214 A. D.) killed his queen Malayavati in the sexual orgy of the Madana festival. Chola king giving a blow on the breast of the courtesan Chitrassuṇṇi killed her during sexual intercourse. The commander-in-chief of the Pāṇdyas, Naraḍeva, knowing not the arts of algolagnia, made the courtesan Chitrakṣhi deaf by giving a blow on her ears (Ka. 6, 7, 26-28). A ruler should be particular where he goes to make love. The Abhira king of Kotta (in Gujerat) went to banker Vasumitra's house to make love to his wife. The king's brother, knowing of this love intrigue, engaged a washerman to kill him, and usurped the throne. The Kāśi king Jayasena was killed by his cavalry chief (Ka. 6, 5, 17). According to Arthashastra (1, 20, 41) Kāśinga king Bhadrāsena was killed by his brother Virāsena who had hidden himself in the antechamber of his wife and usurped the throne. Kārvea king Dadhira (Shahabad Dt.) was murdered by one of his two sons who being enraged at the king's desire to consecrate his brother had hidden himself under the bed of his mother. Suprabhā killed Kāśi king Mahāsena by offering him poisoned fried rice so that she might get kingdom. Vairanti king Ratnadeva was killed by his wife who enraged at his co-wives hurled at him jewelled anklet, besmeared with poison. Virāsena of Sauvira was killed by Hamaavati by means of her jewel in the waist belt which was poisoned in the middle. Ayodhya king Parantapa was killed by Jarutha who in a feigned passion hurled at him a sharp mirror. Vriahni king Vidhuratha was killed by his queen Bindhumati, who had

hidden a small dagger in the braids of her hair. Sexual morals seem to be loose. It appears that the village mayor could easily seduce village girls, the female cook or storekeeper. Or the superintendent of weaving could openly seduce the female workers—widows, women without any supporter or strolling girls—employed in spinning and weaving cotton, linen, hemp or fibres. The police officer could easily seduce the women in the lockup at night. The superintendent of cattle could seduce the shepherdesses (vraja yoshi; Ks. 5, 4, 5-10).

Droit de Seigneur was not only prevalent in medieval Europe, particularly in France, it was also widespread in S. and W. India. It is the custom among the Andhras that the bride on the tenth day of her marriage enters into the palace with her wearing appais; there being deflored by the king, she returns home. The wives of the chief officers of the king of Vatsa-Gulma (in Hyderabad) spend a night with the king in his palace. Pretty women in Vidarbha (Berar) spend a fortnight or a month in the palace for the pleasures of the king. In Darsana and Aparanta (Konkan), the chief officers send their wives to the King. In Saurashtra (Surat) for the pleasures of the king, city and country women either singly or by batches enter into the palace (Ks. 5, 5, 19). The ruler was entitled to $\frac{1}{10}$ of the animals and metals; $\frac{1}{10}$ of the grains and slaves; and the prettiest of marriageable maidens (MBh. 12, 67, 23-24). But the female inmates of the palace bring virile young men into their apartments which are not well-guarded. Abhira women unite with their military guards. In Vatsa Gulma, sons of nobles enter into the female apartments with the connivance of palace officers. In Vidharva profligate princes unite with any female excepting their uterine mother. In Stri Rajya (Sub-Himalayas) women copulate promiscuously with their kinsmen, but not with others. In Gaura women unite with the Brahmins, friends, officers and admirers. In Sindhu region women have congress with the guards, workers and men of that sort. In the Himalayan regions daring young men enter into female apartments by bribing the gate keepers. In Anga, Vanga and Kalinga Brahmins come to present flowers to ladies behind the curtain; and in the east nine or ten women sport with one young man (Ks. 5, 6, 13). But the ladies who cannot secure men gratify their sexual impulses.

with their female friends or nurses, virilizing them with the artificial penis, or root or tuber (radish), fruit (banana or slender brinjal); or with hermaphrodites (*purusa pratimā avyakta-linga*: Ks. 5, 6, 2-3). The men that cannot secure women fulfil their detumescence with female animals—ewe, she-goat, she-ass, artificial vulva (*stri pratimā* or by masturbation (Ks. 5, 6, 5). In MBh. (13. 88) artificial phallus and mouth (8, 188, 41) are mentioned for sexual gratifications. In Dhammapad Althakatha (X1, .) it is said Mallika used a pet dog and her husband Prasenjit a she-goat for their lustful pleasures. In Rv. (x, 38, 2-3 : 1, 105). Kurusravana prays to Indra that cares and anxieties are consuming him a *Sisna* (artificial penis made out of leather a the Gk *olisbos* is eaten by mice. If a man has non-vaginal (*ayanau*), that is, anal intercourse with a woman, he shall be punished with the highest fine. If a man has homosexual union (pederasty) he will be punished with the highest fine. If one has sexual congress with beasts he shall be fined 12 *panas*; if one practises masturbation with idols (*dāivata pratims*—pygmalionism), the person shall be punished with twice the fine (Artha Śāstra 4, 13). Fellatio or masturbation through a female (Manu X1, 26), anal intercourse, pederasty or bestiality, Manu (X1, 174-176) regards very lightly. A bath is sufficient. The Egyptians, Babylonians and Arabs (Herod 1, 198), Romans, Jews (Levit. 16, 16) used to bathe after coitus and wash out the genitals, a prophylactic measure. Clitoris or penis was regarded like mother's teat. Sucking milk from mother's teat gives pleasure not only to the baby but also the mother. In sexual excitement her lips become tense, her breasts swollen and her nipples turgescient. By licking and sucking the penis in the mouth, a fellatrix felt that she not only gave sexual erethism and consequently pleasure stimulation to the man of languid and unresponsive organ, she got also the vital fluid—the semen, the swallowing of which gives a tingling pungent warm sensation like spiced wine, and equally stimulating by its absorption in the system. The eunuchs were fond of it especially. A woman feels not only refreshing energy by the absorption of the semen through the vaginal mucosa in sexual congress, but also through the grasping and contraction of the neck of the uterus like the mouth of a fish for nearly 5-8 times in about 10-15

seconds, to ostensibly suck in the pumped out sperms, and resultant relaxation of the venous and nervous congestion and tension (detumescence). The tongue also may afford the similar gratifying orgasm. The Hindus did not regard the penis or vulva unclean. The vulvar lips were the petals, and clitoris the seed of the *lotus of life*, growing in the fountain of love (*kāma salila*—Lat. fons); the pubic hair is the sacred grove (*kunja*—Fr. buisson—Lat. *plantaria* or *vinea*). The *linga* is the root of existence. Yet fellatio, cunnilingus and pederasty were more and widely prevalent in ancient Greece, among Romans and in modern Europe as voluptuous luxuries than ever in India. "A garden vulva shut, a fountain sealed with shoots, (pubic hairs), an orchard of pomegranates (Song of Songs, 4, 12-13)". When sexual impulses cannot find free outlets for their natural expressions and gratifications, and they are dammed by social conventions, they develop into underground channels, known as perversions. Thus military peoples become addicted to pederasty and fellatio; and the harem becomes the nidus of tribadism and cunnilingus. Perhaps the Hindus learnt these abnormal sexual modes from Greco-Romans who were adepts in them. On the other hand village maiden in Stri Rājya (sub-Himalayas: among the Khāsas and their allied tribes there is polygamy among the nobles and the rich and polyandry among the masses) and Bahika has to gratify many young men (Ka. 8, 6, 24) at the same time as fellatio, sodomy and natural sexual congress. In Bhuvaneśvar and Kanarak temple baseliefs fellatio is depicted.

Four racial types of women are classified in Kāmasūtra. *Padmīnī* is the best of them. *Padmīnī* is an Alpine woman; but Aryan maiden is included by some. *Ratirahasya* says that *Padmīnī*'s breasts are globular like a pair of Aegle marmelos (*triphalā stanayugalam*) and her nose is fine like the sesame flower (*tila kusuma samānam bhīṣakā nāsikā*). Anangaranga says that *Padmīnī* has the soft lustrous open eyes of a young gazelle and round face like the full moon (*kṛāṅga sāra nayana purnendu tulyānam*) which are all Alpine traits. Pancasāyaka says that *Padmīnī* has full moon face, restless eyes, well developed breasts and bronzed complexion (*sampurnendu māhī vilolanayana pinastani gauradṛuṭi*). But *Smaradīpikā*

describes *Padmini* as an Aryan maiden—a red-lipped blue-eyed blonde (*raktausthi nilanayana Gauri*). *Citrini* is described as a Mediterranean type. *Rati Rahasya* says that *Citrini* is neither too short nor too long, is slenderly built (*anatidirgha nati kharvā krishāngi*). *Smaradipikā* says *Citrini* is a brunette (*gaurāngi*) with a slender waist (*krīśodari*), very graceful (*līlāpatī*), has a smiling face (*vismitānana*), has gazelle eyes (*mrigākṣhi*), large hips (*guru nilambī*), but sensual (*kāma citrini*). *Sarangadhara* *paddati* says that *Citrini* is fond of songs, and dances (*gitānityāpriyā*) and of artful dress (*citrāmbaresini*). *Rati Manjari* says that *Citrini* is of medium size, has a nose like sesame flower, is a beauty, but fond of sensual delights (*tīla kusumasunāsā, sundarī ratirasaratā*). *Sankhini* represents the Cespian type. *Sankhini* according to *Ratirahasya*, has a high-vaulted long head, is tall (*dirghadeha*), heavily built, has large feet, very long and deep vulva with developed mons veneris. *Anangaranga* says that *Sankhini* has a hypsi-dolichocephalic (*dirgham bāhyasirah krisham*), heavily built tall body (*prithum deham*), has a long and deep vulva, covered with luxuriant hair. According to *Smaradipikā*, *Sankhini* is very tall (*dirghā*), has long hair on the head (*dirgha siraruha*), a brunette (*gaurāngi*) with aquiline nose (*tikshanāsā*) and large vagina (*visala jaghanā*), and is very sensual (*ratidirgha cakāmukhi*). *Hastini* is the Dravidian. According to *Smaradipikā* the Dravidian woman is ugly (*vikala*), is short sized (*kharvikā*). Her lips are hanging (*lambasthi*); her nose is short and curved in the middle (concave platyrrhine nose). Her vulva is flabby (*bhagasthula alpoloma*) with very little pubic hair. But she has thick hair on her head (*vahulomini*) and she is dark (*syāmā*). According to *Rati Manjari* she has got thick lips (*sthulādhara*). According to *Anangaranga* *Hastini* has a fleshy nose (*pina ghrāna*) and hanging (everted) lips (*lambosthika*). These four types correspond with the male *Sasa*, *Mṛiga*, *Vriha*, *Asva*.

Sasa (Alpine), according to *Ratirahasya*, has large eyes (*atāmrasphārenetrā*), roundish face, has fine soft hair on the head (*sumridusirasija*). According to *Anangaranga* *Sasa* has very soft (silken) hair (*komalakuntalah*), large eyes (*prithudrisak*). *Mṛiga* (Mediterranean) according to *Pancasakhya* has

very fine hair (*sucarukesa*), long neck (*sudirghakantika*), restless pretty eyes (*capalaś śuśratra*), Vriśha (Caspian) has a high vaulted long head (*sparśtyunnata mastakā*), well-built body (*prithutare*), very tall (*dirgha*) and has a long penis (*nava angulamītan lingam*). According to Ratimanjari, Vriśha has many good qualities (*bahugunas*) and has a very quick orgasm (*sighrakāma*). Asva (Dravidian) has thick long lips (*sthula*), has a long flabby penis, long arms and is slow in coming to his orgasm. Pādmīni emits from her mons veneris and armpits the sexual apocrine odor of lotus, like the Alpine women of musk; Citrīni of honey (*ambergria*); Gaṅghīni, an alkaline odor; Hastīni of elephantine odor (of phosphoric character). Quadrupedal (*dhenaka*) coital posture was regarded as favourable for conception. It was popular in Pompei. The wife on the top of the husband who lies on his back posture was regarded as unfavourable; as well as the sitting posture in which the husband sits on a stool with stretched out thighs and the wife sits on his thighs astride, face to face, her legs surrounding his waist. Banana and whole wheat flour were regarded as favourable for conception. It is known that banana and wheat germ oils are very rich in antisterility vitamin E. As a contraceptive and hygienic measure and contracting the flabby vagina, after intercourse vagina was washed with a solution of alum, lemon juice or a decoction of myrobalans. 12-15th days after the commencement of the menses were regarded as favourable for conception; other days as *Safe* period. During the ovulation period (on 12-15th day after the onset of menstruation or midway between two onsets) when sensitive and observant women experience a slight pain in the uterine region as the ovum (*artava*) bursts from the Graafian follicles and the female egg about 130 microns in diameter is laid in which case a corpus luteum develops in the ruptured follicle. Or there may be no ovulation, all the eggs of that group dying and their follicles being resorbed. The secretion of anterior pituitary hastens the maturity of eggs. If ovaries and testes are removed, anterior pituitary gland becomes vacuolated and stains differently. The earliest sign of pregnancy is the recovery of anterior pituitary hormone in the urine; later larger amounts of estrogen. After intercourse and the ejaculation by the husband, the wife

should remain on her back with legs raised against the hips, elevated by pillows to prevent the ejaculated semen to trickle out of the yoni and to facilitate its entry into the womb. The viability of the ovum in only a few hours; certainly not more than a day. Spermatozoa after leaving the testicles, though capable of movement for sometimes, soon lose their fertilizing power. 48 hours are the longest time for a spermatozoon, when it is capable of impregnating the ovum—the female egg—in a slightly alkaline medium; in acidified secretion, it dies much sooner. So the fertility period does not exceed more than 2 or 3 days during ovulation period which commences just 15 days before the onset of menstruation. The rest of the menstrual cycle are *Safe Period* when conception is not possible. Of course sex is determined by chromosomes and protected by endocrine incretions. The human female ovum has 24 equally paired (X) chromosomes, bearers of heredity. The human male spermatozoa have 23 equally paired (X) and one unequally male (X Y) chromosomes in the unreduced nuclei. Thus two types of spermatozoa are produced; the X-bearing impregnating the ovum produces the female; and X-Y bearing impregnating the ovum, produce the male. Thus in the male there would be 47 X-bearing chromosomes and one Y-bearing chromosomes. In the female there would be X-bearing 48 chromosomes, 24 from the mother and equally 24 from the father. But it has been found out that by starving the tadpoles, more males are developed than females. During famine and war more males are born than the females in the affected areas among human beings. We know there is nutritional sterility. Well-fed, very fat females give birth to very few children, possibly owing to the fatty accumulation at the mouth of the uterus, thus tightening it and preventing the entry of spermatozoon. It is very likely when nutrition is lowered, females cannot survive in the struggle for existence. So if conception takes place when the spermatozoa become old and debilitated, X-bearing spermatozoa (which produce the female) die out, while the XY-bearing spermatozoa which produce the male can only survive. It is known that the ripe ovum is discharged from the follicle just on the fifteenth day before the onset of any menstrual period. And the

fertility period of the ovum is only a few hours. Spermatozoon has a life span in the vaginal orifices or uterus of only 8 days. But within 24 hours they lose their motility and fecundating power. If sexual congress takes place with mutual orgasm on the 15th or 14th day before onset of menstruation, pregnancy is fairly certain to follow. As spermatozoa can live for 8 days in alkaline medium in the vaginal passages and in uterus, so sexual union on the 16th or 17th day before the commencement of menstruation, there is also likelihood of pregnancy. One day on each side may be added as a safe measure. So excepting these 5 or utmost 7 days, the rest of the days of the menstrual cycle may be regarded as a *safe period*, free from any fear of conception. Among the Aryas, Yādavas and Nāgas, the usual posture was that woman lying supine on her bed, her thighs spread out, her knees half bent, and the man covered her, sustaining himself on his elbows or knees, or resting his entire body over her, breasts over breasts, face over face, lips upon lips, intertwining themselves, fingers stroking and caressing breasts, forehead, or locks or nap of the neck. "Yāmi ardently passionate makes her *yoni* his bed like a wife yielding herself to her husband so that like chariot wheels we can make (copulatory) movements (Rv. X, 10, 7)". But if wife did not get her orgasm, and her husband was tired, he holding her neck by one hand, and pushing her waist by the other hand, she doing likewise for support, both of them lifting themselves up in a sitting posture, the contractions of her vaginal walls holding the penis, in warm soft voluptuous grip, and not allowing it to slip off, she sits astride over his thighs, and the husband is gradually put on his back, and she makes wheeling movement of her buttock as long as she does not get orgasmic relaxation. Yaksha or Kushans, Kinnaras, Madras, Kāsyapa, Bhṛigu women often preferred the reverse position. The man resting his back on the bed; his leg stretched out and slightly bent; the woman gradually spread over him from half-kneeling posture between his spread out thighs; or one leg over that of the male partner; thus two bodies intertwined, moving in rhapsodic rhythmic motions, in voluptuous utter abandon (*utfullak*); or she rides astride over his thighs; introduces the penis into her vagina, and then leans towards his face and

kisses him, vibrating her waist in corkscrew movements. But if the penis appears to be large-sized and the vagina is narrow and short, Anangeranga recommends preliminary caresses to dilate and lubricate the vagina by sexual excitement for the intromission and accommodation of the large penis. She should lie supine with her legs widely apart and her knees drawn up. The husband should cover her, supporting himself on his elbows and knees. But if it does not distend vagina sufficiently it should be caused by cunnilingus or tickling the clitoris. A forced and sudden thrust of the penis within the vagina may not only tear out the soft vaginal linings if not sufficiently lubricated but may also bruise the fold of mucous membrane passing from the under surface of the glans penis to the deep surface of the prepuce. Virgin and newly married girls have transverse folds (rugae) in their vagina (more pronounced among Negro women which add frictional pleasure) which are worn out and polished by long-continued sexual unions. And the wife and the husband should sleep on their sides like the Annamese, interlacing their hips, thus facilitating intercourse, arms embracing each other's neck, and lips kissing each other. This lateral posture is also advised during pregnancy. But if the husband is heavy and tall and the wife is delicate and undersized, the husband shall lie supine, the wife shall ride over his outstretched thighs and inserting the penis into her vagina shall lean on his breast, hold his neck by her arms, and shall make a rotatory corkscrew movement of her pelvis, lifted by his hands (still popular in S. India). But if the penis is undersized, the wife in her supine posture after the insertion of the penis shall bring her thighs closer together and stretch out the legs; this will tighten up the vaginal walls and grip the penis and prevent its easy slipping off; if a pillow is further placed under her buttocks or loins it will enhance the penial pressure against the clitoris. The wife sits at the edge of the bed, her legs dangling apart in a half-sitting posture, her head leaning against a high cushion. The husband standing between her knees, inserts his penis into her prominent vagina, the elasticity of which is thereby increased and muscles become slack, thus presenting closely against the vaginal walls and clitoris. This

posture is recommended in the preliminary sexual unions with virgins. The husband is seated on a stool; the wife rides across his outstretched thighs face to face; inserting the penis into her vagina, she closely embraces him, kisses him holding his neck by her arms, he with his arms lifting and lowering her buttocks, thus facilitating her side to side rotatory pelvic motions, and promoting mutual pleasure. If however the vagina is large and dilated, the Nepalese and Abom women prefer after the Chinese fashion to lie on her back, lift her legs and place them on the shoulders of her husband who approaches her in a kneeling posture and performs the sexual union. If the wife kneels down and leans her forehead on the outstretched crossed elbows on the ground, and the man copulates with her in a kneeling posture from behind, her buttocks raised, like the Chamars, loud copulatory sounds are heard, as vacuum is created by the uterus hanging downwards, the vagina is stretched, and consequently air is sucked in with coitional movements. It is recommended in unions of long penis and short vagina. It is favourable for conception. Among the Veddhas of Ceylon coitus is affected in the crouching posture, both partners squatting on their hams just like the Austries (karkataka). The male monkey brings the female monkey between his spread out thighs and holds her with forepads. The Apes also use quadrupedal posture. Among Mahars the woman lies flat on her back with drawn up legs, and the man squats on his heels between her legs just among some Negrito tribes of Sumatra, and gradually lifting her upper body, copulates face to face by holding her neck by his arms. Among Santals like Austries woman bends forward, supports herself like animals upon her spread out legs and two hands, and the man approaches her from behind and winds his arms round her body (dhanuka). Their vulva is more or less posteriorly situated as among the Austries and Negritos. Among the Nagis the woman is on her half-bent knees and she lowers her head and she supports herself on her elbows, and the man performs his coitus in half-kneeling posture, bending his body over her, and placing his arms around her body (ardha utpirak). Among the Babaras the man kneels supporting his hump on the upraised heels and the woman is seated face to face with her legs

across his thighs, each one holding the other by arms; it is depicted in Minākahi temple pillars. Among the Vakatah Nāgas, as depicted in Ellora frescoes, woman sits on his lap astride on his thighs, crossing her legs behind the waist of the man, placing his arms round her neck, and he holding her waist with his arms and kissing each other; in another scene, the same posture, the woman having her legs astride over his thighs is in a kneeling position between his spread out legs (*vijramuktika*). Among the Kanets of Nepal the woman lies on her back, her buttock raised over a pillow, her legs either bent towards her thighs or spread over the shoulders of the man who approaches her in a kneeling posture (*irimbhikta*). This posture is common in Egypt of 5th century B. C. And still customary in Abyssinia. Among the Oraons the woman stands against a tree and the man approaches her in a standing posture, holding each other's waist by their arms (*stambharatha*). Among the Guptas the woman used to lie supine on a bed, her buttocks resting on the edge of the bed and man approaches her legs, slightly parted, resting on the floor, in a standing posture, bent over the upper parts of her body which alone is on the bed, holding each other's waist by the arms, or caressing with fingers breasts or forehead or kissing each other. This exposes the beauty of tightened vulva, and turgid clitoris comes out of preputial sac. This posture is also recommended where the vagina is large and the penis is small-sized. In Kausambi terracotta figurines of Sunga period, now in Allahabad Museum, have been found, depicting sexual unions in sitting postures. In one plaque a couple is seen, sitting on a chair, face to face; the female partner is astride her lover's thighs, her legs tightening round his loin. The male holds a wine cup (*madhu patra*) and the female a wine jar (*madhu ghata*) in one of their raised hands. In another the woman and man are kissing each other, holding his neck by her arms while he with his hands are lifting up her buttocks and pressing her in close embrace. This coital mode is popular in South Indian temple bas-reliefs. This posture is recommended in the first sexual union with a virgin as it causes less pain in intromission of the penis. The hymen of the Hindu girls is generally torn in their early girlhood by the forefinger of their

mother in daily washing the vulva with water. The knowledge of varieties of copulatory postures is useful to all. By tests and trials the sexual partners can find out thereby the posture which will afford them the natural ease, the utmost voluptuous thrills, sensory delights and quick orgiastic pleasure and relief. The various poses also bring out the latent erotic charms, thus adding sensory gratifications. This art of love any one can easily acquire and thereby enhance the valuation of love. This beatitude every creature craves and is within the reach of many by inquisitive slight efforts, and which none should forgo and everyone ought to obtain. But this refinement of life and love only the civilized peoples who are supplied with abundant nutrition and luxuries of life, distressed by very few worries, anxieties and cares, and need and seek diversions of physical energy outlet, can easily secure. *Anangaranga* (x) says: "The principle cause of the estrangement of the married couple which throws the husband and the wife into the arms of others is due to the absence of varied pleasures and the monotony which accompanies absolute possession. Monotony engenders satiety, and satiety brings repulsion, even of the sexual intimacy. The husband varying the pleasures of his wife will find in her various charming phases of many women by procuring in her new sexual delights, thus driving out monotony, which she will reciprocate."

15.—THE CULTIVATED PLANTS

Barley cultivated (*Hordeum vulgare*) has been found at Mohenjodaro like that of predynastic graves of Egypt. The wheat found there has been identified with *Triticum compactum* or *sphaerocum*, which are grown in the Punjab to-day. The wheat found at Mohenjodaro has 21 chromosomes which occur in wild state in some parts of Persia. Wheat found at Anau at lowest level is of the same type. Date stones also have been

found in abundance in Mohenjodaro. A few minute scraps of cotton adhering to the side of a silver ~~was~~ show that it is a coarser variety of cultivated *Gossypium arboreum*, and not the wild one, *Gossypium stocksii*, which is also found still in Sind, ~~as~~ it developed the convoluted structure which the later lacks. The Mohenjodaro people, rich and poor like, were fond of spinning cotton and wool as numerous spindle whorls have been found, practically in all houses. Besides barley, wheat and dates, the food of the Indus peoples comprised beef, mutton, pork, poultry, flesh of ghariwal (*Gaviwalis Gangeticus*), turtle, tortoises, fish from the Indus (*Rita rita* and *wallago*) and dried fish of *Arius*, caught in the sea.

The domesticated animals included humped bull (*Bos indicus*), buffalo (*Bos bubalus*), sheep, elephant (*Elephas maximus*), camel (*Camelus dromedarius*), pig (*Sus cristatus*), fowl (*gallus*), ~~as~~ their skeletal remains have been found at Mohenjodaro. Bones of dog (*Canis familiaris*) and horse (*Equus caballus*) have been found near the surface. *Equus caballus* is probably of the same stock as the modern country bred horse of Western India, closely akin to the Anau horse. Humped bull was very numerous. It resembles the white and grey breed still common in Sind, Gujarat and Rajputana but unlike those of Central India and Dekhan. Seals 337-340 in plate 91 show their type realistically. Representation of short horned and humpless cattle are found in terracottas of Sind and Baluchistan, though their bone have not yet been discovered. But no bone or representation of cat has been found. The bones of wild or half-wild mongoose (*Herpestes surpunctatus*), shrew (*Oreocidura bediana*), the black rat (*Mus rattus*) have been found. Other wild animals which are figured on the seals, copper tablets or terracotta are the Gour or Indian bison (Pl. 110 308-25), rhinoceros (Pl. 111, 342-7), tiger (Pl. 111, 350-0), monkey (Pl. 98, 13; 98, 5), bear (Pl. 144, 4) and hare (P. 117, 5-5). Four stag horns of hogdeer (*Cervus porcinus*), Kashmir stag (*Cervus Cashmerianus*), sambhar (*Cervus unicolor*) and spotted deer (*Cervus axis*), possibly for medicinal purposes, have been found; of these hogdeer is only native of Sind. And Kashmir stag is found in the Himalayas between 900-12000 feet altitude. Like cat, lion is unknown in Indus civilization. In further excavations of Mohenjodaro by Mackay

the following animals are indicated by findings, either in bronze or terracotta. And majority of them might have been used for food consumption. *Bos primigenius* - *Urus ox*. *Bos namadicus* of Narmada deposits resembles closely *Bos primigenius* Bronze buffalo (Pl. 71, 23) of fine modelling, possibly by *cire perdue* process. A domesticated life like cock (Pl. 71, 1). Fighting cock (Pl. 77, 7) indicated by the remarkable aggressive attitude of the tail. Peacock (Pl. 80, 21). Duck (Pl. 80, 16). Goose (Pl. 77, 10). Dove (Pl. 77, 28). Monkey (Pl. 78, 2). Kid (Pl. 80, 14). Bronze goat (Pl. 78, 18; 19). Clay Sheep (Pl. 80, 8; 12). Turtle (Pl. 77, 21). Dog (Pl. 77, 17). Bronze antelope (Pl. 77, 1). Black buck - *Krishnasāra* (Pl. 58, 4). Singing bird (Pl. 80, 26). In early dynasties of Egypt after the Nile flood withdrew the ground was sown with corn seeds and after sowing, swine were turned in the fields who treaded in the corn. Straw of barley and wheat was used to bind sun-baked bricks. Wild pig was domesticated. And cattle was used. Examination of the pre-dynastic stomach of 3500 B.C. has shown that it contained millet (*Echinochloa colonum*), barley and tubers of nut rush. Wheat (*Triticum dicoccum* with flat ears, having long awns; *Triticum durum*; *T. Vulgare antiquorum*) and barley (*Hordeum hexastiction*) of 2000 B. C. *T. dicoccum*, onions, radishes, lotus flowers have been found in a tomb of Deir el Bahri, Thebes, of 1500 B. C. Onions, figs, dates, lentils, beans, melons and garlic of 2200 B. C. Grape in the tomb of Ptah Hotep of 3000 B. C. The painting of grapes during the fifth dynasty. Raisins in ancient tombs. Pomegranates during 20-25th dynasties. Linen in Menes Tomb. A thread of linen in bricks of Dahshur. Seed capsules of flax in 12th dynasty (2400-2200) B. C. (Lotus seeds (*Nymphaea lotus*) eaten both green and dried. Roses picked in bud stages and made into garlands in order to prevent petals from falling have been found in early tombs. The starchy rhizomes of papyrus (*Cyperus*) were cooked and eaten. The pith of papyrus was pressed and made into paper for writing purposes. Carbonized grains of barley and a primitive type of emmer wheat have been found near Neneveh of 2000 B. C. Assyrian Tiglath Pileser of 1190 B. C. mentions apricots, figs, olives, pomegranates, quinces and grapes. Assyrians artificially pollinated the apathes of the pistillate trees, thus showing that they

understood the sexuality of the date palm. Assyrian : Armanu-apricot ; As-asafetida ; Azipiranu = Saffron ; Kudimerianu = cardamon ; Karsu = cherry ; Nushu = Nux, almonds ; Samassam-mu = Sesamun, sesame ; Papa = Papaver, poppy. Poppy is Akadian *irru*, Sumerian *unmantel* ; and even in the Sumarian period, poppy in a seal is mentioned as the *plant of life*. Yatakās mention barley (*yava*) and rice (*tandula*). But there is no mention of *godhuma* (wheat). It seems therefore that wheat was a later introduction in north-eastern parts of the country from Sindhu region. The people took beef. In *Langustha Jat.* (144) we find that the hunters killed the cow of a hermit, roasted it in his fire pit and enjoyed the feast. In *Grikapati Jat.* (199) we find that during a famine the villagers took an old cow from the village mayor on condition that they would return its value by rice after two months, lived on its meat for a few days. Venison was liked. But pork (Nyagrdha Jat 12, Kurangamriga Jat 21) was the popular meat. Pigs were fattened to make pork palatable and for festal occasions (Munt jat, 80 ; Satuka (286 ; Tundila jat. 388. Monkey meat was also popular (Mahakapi Jat. 407). Iguane (Godhā jat, 325) and pigeon (Romaka jat. 277) meat curry cooked with sourmilk, pepper, cumin seeds, salt, ginger, and rice was regarded as delicious ; wild fowls (kukkuta) were much relished (Sri Jat. 248 ; Nyagradha Jat. 444). They were also kept as pets. A Benarasi professor kept a cock to rouse his pupils early in the morning (Akālavsha Jat. 119). Anāthapindaka kept a white cock in a golden cage (Sri Jat. 248). Onion was popular. It was excessively consumed in festal dishes. Being permitted by a farmer to take 16 onions per person, nuns once pulled out practically all the onion plants of the farmer. At this the farmer complained to Buddha at which the Buddha forbade the use of onions to nuns (Suvārṇa Hamsa Jat. 136). Manu forbade excessive consumption of onions and garlicks (6, 19). Barley (*yava* : Rv. 1, 117, 21 ; Zend. *yava* ; Gk. *seia* ; Lith. *javai*) was perhaps introduced into Northern India by the Aryans. Vedic Aryans used to take barley grains cooked with milk (*khira audana* : 8, 69, 14), barley cakes fried in butter (*apupa* : 8, 52, 7 ; *pakti* : 4, 24, 5) and porridge of fried barley mixed with sour milk (*karamba* : 8, 52, 7) ; fried barley powder mixed with Cannabis indica paste (*soma*) and sour milk (*yavasir* : 1, 219, 22).

From barley grains (*dhanya*; Lith. *dawa* = bread), beer (*dhanya* rasa, Av 2,28,5) was brewed and drunk as a stimulating drink. Barley is the most ancient of cultivated plants (*Hordeum hexastichon*). The six-rowed barley has been discovered in Egyptian tombs dating from predynastic (B. C. 5000) and early dynastic periods and Swiss pile dwellings. It is mentioned as one of the five cereals sown by the Chinese emperor Shennung. It was an important article of food of Solomon. It is represented on the medals of Metapontes of S. Italy of 6th century B. C. The Chinese used malted barley in dyspepsia.

Wheat (*godhuma* = Va. 18, 12, cow's smoke, possibly derived from Pera, *gaudum*) has been found at Mahenjodaro. It is not found mentioned in the *Rigveda*, but found in *Atharvaveda*. Wheat grain has been found in the Egyptian pyramid of Dasher of 2230 B. C., in the Swiss lake dwellings of 1100 B. C. and the cereal (ma) was sown by the Chinese emperor, Chinunung in 2700 B. C. It is very likely that Afghanistan has been the nursery of bread wheat, for 80 varieties have been found there, and 52 in Iran, while there are not more than 20 varieties of bread wheat in entire Europe. The wheat germ contains 80 mg of anti-sterility vitamin E per 100 grams. The germ of maize containing only 18.4. *Avena sativa* (*Oat* = Hind. *jai*), was known in ancient times in Asia Minor, Eastern Europe, Germany and Central Asia. According to Pliny, Germans used to live on oatmeal porridge. O. Slav. *Ovisu* is related to Latin *Ovis*, so it is likely *avena* originally meant sheep-weed. According to traditions Janghis Khan introduced it in India. In Ain-i-Akbar (1590) it is mentioned that Moghuls used it as a horse fodder. Rice (*Sali*, *Vrihi*, *Tandula* = *Oryza sativa*; Rām. Bāla, 5) is found mentioned in the *Atharvaveda* (12, 1, 42). *Vrihi* (O. Pers. *virinjé*) means stimulating, growing fast, the Bengal *Boro* rice. Wild races of rice (*O. fatua* and *O. minuta*) occur in moist places from eastern Himalayas to Ceylon and southernmost edge of China through Burma and Indo-China to Java, Borneo and Philippine Islands. But nearly 300 to 400 distinct races are found in Malaya which is likely to be its primitive home, and all having 12 chromosomes. Rice spread from the east to west. Herodotus who travelled in Babylonia and Susa between 464 and 447 B. C. stated that wheat was eaten in Persia.

and does not mention rice. But Aristobolus mentions in 285 B.C. that rice was grown in Babylonia, Bactriana and lower Syria. Chinese Can Kieu in 2nd century B. C. mentions its cultivation in Parthia and Babylonia. And in the early Christian era, it was grown all over Persia where irrigational supply of water could be made available. Persian *virinzi*, Pashtu *urisha* (*urizey*) Skt. *urishi*, Beng. *boro*, Jav. *pari*, Arabic *aruss*. *Oryza* may have been named from Tamil *arisi*. The unhusked rice is usually steeped in warm water for 3-4 days; it results in a little malting. The grain is heated again to boiling point until the husks open slightly. During heating the starch is partially gelatinized and the grain is rendered more or less transparent. It is now not so liable to be broken by the hullers in milling as untreated rice. Parboiling results in a slight loss of fat, but without any appreciable loss it fixes the vitamin contents which are lost by polishing. The Chinese use sprouted rice grains (malted) as a peptic tonic. *Asu Vrihi* (Ts. 1, 8, 10) is the *Ausa* Dhāna of Bengal. Pearl Millet (*Priyangu* - Vs. 18, 12) *Bajra* - *Pennisetum glaucum* or *typhoidum*) is of Egyptian origin. It grows in northern India on dry hot soil in arid climate as it requires less moisture than *Sorghum vulgare* (*jowar*). But it ripens earlier and is a wholesome food in hot weather. The millet and its straw are also used as a cattle fodder. It contains carbohydrates 73, 62 p. c.; proteids 9, 62 p. c. and minerals 1, 73 p. c.; cellulose, 7.8. *Panicum miliaceum* (*Chenā*) is of Central Asiatic origin. It was extensively cultivated in eastern Europe in Roman times and China. It is cultivated on poor soil in India with *Panicum mliare* (Little Millet - *Kungu* - Anu; Av. 18, 20, 4). The grain however is digestible and nutritious. It contains 65, 20 carbohydrates; 8, 04 proteids; 4, 57 fat; cellulose 7, 89, p. c. It is parched and eaten; or the husked grains are cooked like rice and on ceremonial occasions into an excellent milk porridge. *Sorghum* (Great Millet - *Jowar* - of the nature of barley - *Nivāra*; Vs. 18, 12) seems to be of upper Egyptian origin; was introduced into Iran in the first century A.D. It is an upland valuable crop. It contains almost 70 p. c. carbohydrates, 10 p. c. proteids, and 3 p. c. fat. Next to barley, *Sorghum* and *Eleusine* are good for malting, and fermented drinks are prepared from them. But when its leaves and young

shoots are used as a fodder, cattle poisoning may take place due to hydrocyanic acid produced in the tissues by the interaction of a glucoside dhurrin and an enzyme.

Eleusine coracana. (Raji), the cultivated form of *Eleusine Indica*, is a native of South India. It produces an abundant crop in 2½ to 4 months. The grain is bitterish and is used by poorer classes. It is malted and a light bitterish beer (*buzza*) is made from it. **Maize** (*Bhutta* = *Zea mays*) is of Mexican origin. The Spaniards introduced this valuable American corn in Philippine Islands whence it has spread to India.

Masha (*Phaseolus mungo* = *Mash kalayi*: Av. 8, 140, 2) is indigenous. Its green pods are eaten as a vegetable. Ripe grain is the most esteemed of pulses, as its legumin or vegetable casein makes up the deficiency of the protein poor vegetarian diet of the Hindus. It is parched and ground into flour and made into wafer biscuits, with spices, known as *pappad*. **Muga** (*Phaseolus aureus* = *Kāncana Muga*) is the yellow coloured pulse. It is husked and split open, and cooked as a valuable addition to rice diet. Crushed into a thin paste with a little water, it may be made into vegetable cheese balls and cooked and eaten with great relish. It is indigenous and cultivated all over the country. *P. acutifolius* (*Bana Muga*), a perennial or annual slender climber found throughout India up to 48000 feet, producing the green variety of the pulse. *P. lunatus* (*Lima Bean* = *Barbot*) has been introduced by the Spaniards from Lima in Peru. There are numerous races in cultivation, differing in the size, shape and colour of the pods and seeds. Young pods are quite safe as a nutritious food. But old seeds sometimes may develop hydrocyanic acid which is easily removed by soaking the seeds in water for 24 hours and throwing away the water, or removing the testa between two-boilings. *Dolichos biflorus* (*Kulatta* = *kulthi* = horse gram) grows all over India, but particularly in Madras and Bombay. **Cajanus indicus** (pigeon pea = *araki* = Hind. *arhar*) is a native of Africa and was cultivated in Egypt before 2000 B.C. in the time of 12th dynasty. With the Negro slave trade it was introduced to Guam in 1774 and thence to tropical America. The Egyptians introduced it to Syria whence it has reached India and is cultivated in northern India as a valuable pulse.

It contains about 22.8 proteids; 50 p.c. carbohydrates; 2, 1 p.c. fat; 3,0 minerals and to 2, 8 cellulose. *Pisum arvense* (field pea - mator) was cultivated in Eastern Europe and it reached the Greeks via the Black Sea and the Latins and Germanic tribes from the Greeks. Through Central Asia and Tibet it reached India where it is extensively cultivated. The green seeds are eaten as a cooked vegetable and sometimes uncooked. The ripe split peas are cooked as a pulse. *P. sativum* (*bara mator*) is a developed variety of *P. arvense* through selection with white flowers. The seeds have a sweetish taste and are usually taken uncooked and the entire pods while young as a cooked vegetable. *Colocasia esculentum* (*Aratu*; Av. 20, 131: *kachu*) is indigenous. It reached Egypt from India in first century A.D. and passed along the Mediterranean into Italy and Spain. And in the east it reached the Pacific Islands, where it is known as taro. Its tuber contains on the average about 18 p.c. of carbohydrates, mostly in the form of sugars, 6 p.c. of protein and 5 p.c. of fat, but more cellulose than in potato or yam. The tuber is cut into pieces, boiled and made into paste which may be used as a substitute for cereals. Not only the tubers, but leaves also edible. Cooked leaves contain about 4, 1 p.c. of protein, and 2, 0 p.c. of carbohydrates. The tuber is fermented and is made into a pickle with the addition of lime juice, salt and chillies. The stem is hæmostatic and applied in wounds. Some of the leaves and tubers are acrid. The quantity of needle crystals in the leaf-tissues increases with age, and a double boiling even with young leaves is desirable. The crystals in the tubers are found in the superficial tissues and peeling will generally remove them. *Colocasia* (taro) contains *sapotoxin* which appears to damage adrenals. *Sapotoxin* also develops in decomposing fish. The injections of Diphtherial antitoxin and toxoid which stimulate adrenals as a reaction are proving effective in treatment of leprosy. The habitual users of *colocasia* (taro) and rotting fish are found to be susceptible to the attacks of leprosy. *Sesamum orientale* or *indicum* (Til: Av. 6, 14, 02) is of Egyptian origin. In Africa there are 8 or 9 wild races of sesamum. And it was cultivated in Egypt about 1800 B. C. Before that time *Moringa* furnished the cooking oil to the Egyptians.

Assyria adopted its cultivation from Egypt and Assyrian conquests spread it to Iran, Asia, Greece and Italy, where it became cultivated from very ancient times. Northwards it was cultivated into parts of Europe where summer climate allowed its growth. There are black, yellow and red-seeded races of sesame supplying 44 to 57 p. c. of edible oil; 18 p.c. of protein; 25 p. c. of carbohydrates; 3 p. c. of cellulose; 5 p. c. of minerals of which calcium amounts to 1.45; moisture 5 p.c. It is rich in Vitamin A. *Masura* (Va. 18,12; lentil - *Lens esculenta*) is a native of Egypt from which country it was introduced into China and India. In Egypt it was cultivated in olden days. From Egypt it was conveyed to India and it is now cultivated all over the country as a valuable pulse grain. It contains about 23 p.c. protein, 61.14 p.c. carbohydrates, 3.54 minerals, 10.6 fats, and 2.42 cellulose. In Europe this pulse meal mixed with barley is given as an invalid food. *Cicer arietinum* (gram - *Canaka*, Va 18,12, Beng.-*solā*) is a native of Levant of every ancient cultivation, originating from *C. pinnatifidum* of Asia Minor, Syria and Palestine. It grows all over India, particularly surrounding the Agra region. It used to be parched and its meal was taken by the marching soldiers, mixed with water and salt. Many poor upcountrymen still use the same, and call it *canakā* or *solākā chātu*. *Dolichos Lablab* (Beng. *sim*) is a native of the eastern coast of India, but now grown all over India as a garden vegetable whose green pods are eaten. Ripe and dried beans are also eaten like other pulses. *Glycine max* or soja (soy bean - *Chat*), a native of north-eastern China, grows now extensively in Manchuria, China, Java, Burma, Khasia Hills, Manipur and Madras. Soy Bean is the most valuable of pulses. The protein content of its seeds varies from 30 to 45 p.c. and being like the protein of animal flesh, and therefore much superior to the protein of wheat or other cereals. Its carbohydrates are in the form of dextrose and sugars with but a slight trace of starch, varying from 22 to 29 p.c. Fats range from 18 to 22 p.c. Its minerals are mostly phosphoric acid and potassium. The seeds may be parched and made into a meal (*soy*) and thus eaten. Unless the seeds are boiled for a long time there is a bitter taste. The Chinese and Japanese make artificial milk from the

bean which has nearly three quarters of the food value of the cow's milk. The beans are soaked for several hours and then ground between mill stones with the addition of water. Then the liquor is strained through cheese cloth and boiled to sterilize it. Through condensing the liquor by boiling legumin casein is made. The Chinese and Japanese make a number of nutritious and palatable preparations from soy beans. Soy-bean oil is a semi-drying oil, somewhat resembling cotton seed oil, but drying more rapidly. It may be a good substitute for linseed oil, and used in making soaps, varnishes, printers' inks and water proof goods. *Brassica juncea* (*Sarsapa - Bai*) is perhaps of African origin. But it was developed in the Mediterranean regions. Now it is extensively cultivated from Egypt to eastern Europe, China and India. It is grown now all over India. It is one of the most pungent of cultivated mustards. Its green leaves are used as a vegetable, and its seeds as a condiment and for cooking oil. *B. napus* (rape-ton) originated in the Mediterranean. It is cultivated in Kashmir and Afghanistan.

Egle marmelos (vilva : Av. 21, 146, 8) is indigenous and is cultivated all over the country. The pulp of the ripe fruit is made into a *sherbet* which is laxative. Half ripe fruits are roasted and their pulp is taken in chronic dysentery, atonic diarrhea and constipation. A gummy substance surrounding the seeds when mixed with lime sets rapidly and firmly like cement and is used in the construction of wells. It takes a fine polish and is not affected by water. The gum is also used as a varnish for pictures and it adds brilliance to water colour paints. The timber is yellowish white, hard and has a strong aromatic scent when fresh. But the tree and its leaves are sacred to Siva, it is hardly cut. *Zizyphus jujuba* (*vadari* : Va 19, 22, 2) is indigenous and is cultivated all over the country. But it has few races. China however has developed greatest varieties, exceeding 300-500, varying in size from a cherry to that of a hen's egg. *Punica granatum* (*Dadima* : MBh. Susruta) is found as burial offerings of Egyptian 12th dynasty. Its name is recorded in the monuments of 18th and 19th dynasties. It travelled through the southern-side of the Mediterranean. From Carthage it reached Italy where it was known as *Punica*.

by the Romans. It reached Iran and Afghanistan in 2nd or 3rd century B. C. From Iran it reached Northern India in first century A. D. Iranian name of it was *Dulim*, from which, Skt. *Darimba* and Prakrit *Dalim* have been derived. It reached China in third Century A.D. It reached Malaysia in 2nd or 3rd century A. D. where it is called *Dalina* or *Delina*. The best fruits have been developed in Iran and Afghanistan. For its numerous translucent reddish seeds, it was regarded as an emblem of fertility. In ancient Egypt its rind and root-bark were used as a vermicide. The ancient Greeks used the entire fruit, its rind and root-bark as astringents and for killing tape worms as in Egypt. *Susruta* recommends its rind and root bark as a specific for tapeworm. *Mangifera indica* (mango : *Amra* : Br. Ar. Up. 4 ; Rām, Ayodhy. 63, Dasa Br. Jat. 495) seems to be a native of Malaysia where and in Java many races are found as *M. foetida*, *M. lagenifera*, *M. longipes*, *M. maingayi*, *M. microphylla*, *M. oblongifolia*, *M. odorata*. Perhaps from Malay it was introduced into S. India. In Tamil it is called Manga from Malayese *Mangga*. It is the most highly esteemed fruit from ancient days. The ripe fruit contains a good deal of sugar. The acid in the fruit is citric. It is rich in vitamins A and C. A fine ripe mango is relished by all classes of people. Part of the surplus crop is made into fermented drink (*sahakāra surā*) or vinegar (*phalamla*). Mango juice is dried in the sun and made into paste, and thus can be eaten throughout the whole year. Unripe fruits are made into pickles and chutneys. Unripe fruit may be boiled with sugar and turned into a jelly. Mango flowers were used to scent wine in Gupta period. Mango seeds are sometimes grated. And gratings are sieved and washed out in water. By adding coconut milk and sugar, porridge is made out of it. The seed is an astringent bitter and acts as a vermifuge and is given in diarrhea and bleeding piles. *Musa acuminata* (*kadali* ; Rām. Kish. 13 ; Aryan 85, *Sadādanta* Jat. 514) is the wild primitive banana found abundantly in the hill forests of north-eastern India, bearing fruits, full of hard dark-coloured seeds, lying in a thin mealy pulp by eating which birds distribute the seeds. From selection among them through centuries many complex useful races with hardly any seed

have been evolved. *Musa paradisiaca* (plantain) produces big grass fruits which are cooked as their starch in repening is not converted into sugar as in banana. It contains about 25 p.c. of starch and 2 p.c. of protein. The plantain may be sliced, dried in the sun and made into a meal which may be baked into biscuits or given in diarrheas. The flower buds may be eaten as a vegetable, though somewhat astringent. The stem yields a kind of fibre and cellulose which may be woven into lustrous clothes. *Musa sapientum* (banana-rambhā) produces pleasant tasty fruits when ripe. The starchy carbohydrates of the unripe banana, unlike plantain, are converted into sugars. There is a pleasant amount of acidity due to citric and butyric acids together with acid salts. It contains about 0.5 mg antiaterility vitamin E (α-tocopherol) per 100 grams of banana meal. Ripe banana contains about 22 p.c. of sugars; 1.75 p.c. of proteins and 5 to 1 p.c. of fat. *M. rubra* has dull red coloured stem, leaf stalks and midribs, producing a yellowish red ripe fruits; this fine banana of butter consistency is an evolved form out of selection as N. Dacca. Ripe banana may be sliced and dried in the sun and eaten like figs. Alcoholic drinks and vinegar may be made out of it. *Cocos nucifera* (coconut=Nārikela; Rām. Aranya 36, the sea coast of the south was adorned with groves of coconut trees; Visvantara Jāt. 527) is a very useful plant. It developed in Malaya archipelago or Pacific islands, as it is a maritime plant. For the aeration of its roots, the movement of air through a sandy soil produced by the rising and falling tides is necessary; moisture at the crown requires sea breeze. Its floating husk-covered heavy large nuts require water for their dispersal. On the Pacific coast of America three close allies of *Cocos*—*Atlasa*, *Maximiliana*, *Orbignya*, and *Elaeis*, yielding oil from their small nuts have been found. *Elaeis* is also found on tropical African coast; *Jubaeopsis* in Madagascar. And fossil nuts of *Cocos* have been found in New Zealand. But by the distribution of *Cocos*, it seems it has developed in the eastern Pacific than in the western. Anyway its Sanskrit and vernacular name nārikela is apparently borrowed from Malaya. *Nyier* (for coconut) and *Kelapa* (in some places for the tree and in others for the ripe nut); and this great gift of nature to

man reached Indian eastern coast from the same source. A dwarf coconut palm begins to fruit in its fourth year and reaches its best in the 15th year. A tall coconut palm begins to fruit in its fifth year and attains its highest in 15th. Trees sixty years old show no falling off. Even they bear fruits at the age of 90. The average height of the full grown tree is about 100 feet. It may reach 120 feet with leaves. Good trees give 80 nuts annually. Well-tended trees may yield more than 120 nuts. The nut grows to its full size in about 5½ months when meat formation begins. Then for 2 or 3 months, coconut water remains a refreshing drink. It takes about a year for the nut to be ripe. Ripe nuts may fall by the pressure of the wind; but if left they will germinate on the tree. The water of a green immature coconut is somewhat astringent, saturated with carbon-dioxide and therefore a refreshing diuretic drink, and inhibits coli and cholera germs. It may be somewhat anthelmintic. But when the nut is mature, the milk becomes a fluid, no longer astringent nor containing carbon-dioxide, but consisting of 95 p.c. of water, holding in solution proteids, sugars (saccharose in chief parts), salts and vitamin A. With complete maturity the water contains more salts and less sugar than at an earlier stage. The coconut water may be made into an alcoholic drink or converted into vinegar by acetic fermentation. The endosperm of an 8 month old coconut is rather transparent. It is eaten as a delicacy. From this gelatinous state it grows in opacity and becomes less gelatinous. In the transparent stage it cannot be grated. But when it has attained maturity and ripeness, if its flesh is grated, pounded and squeezed, it yields a sap, carrying oil. This coconut milk in addition to salts, sugars and vitamin A carries a certain amount of oil in emulsion. It is generally used for cooking vegetable and meat dishes, sometimes for extracting oil. The coconut oil has the highest saponification number of all commercial fats. Within the nut occasionally a bluish white stone, composed of calcium carbonate (coconut pearl calappa), is found. Coconut is tapped to give toddy. The inflorescence, tied and bound, is bruised with a wooden mallet. The tip is next cut. By shaving off a fresh layer daily and catching the juice in an earthen ware pot, toddy is procured. Each

inflorescence lasts about 2 months, and out of 17·5 p.c. of solids of the toddy, 16·5 is sucrose. So if it be boiled, it forms into brown sugar. But if it be kept standing, it rapidly ferments into a palm wine (*nārikelaśavam*; Raghuvan. 4, 65) and finally into vinegar. Leaves are used for thatching and fencing and for manufacturing hats. The *nidribs* are made into brooms by binding them together. Coir is made from the fibres of the husk. A coir rope by its elasticity does not break so suddenly as do ropes of some stronger fibres. Coir is also used for manufacturing mats. Coir pith, hitherto a waste product, contains a high percentage of lignin which by condensation with phenols may be made into a very useful inexpensive plastic. The wood of the trunk, though not so hard like that of other palms, is used as rafters and posts for building huts.

Saccharum officinarum (sugarcane=*iksha*; Av. 1, 34, 5) is indigenous of northern open upland, related with other grasses, mentioned in the Rigveda—*S. arundinaceum* (sara; Av. 1, 3, 1; *munga* Rv. 1, 161, 8) and *S. spontaneum* (*Kusa*; Rv. 1, 8, 8). When sugarcane is crushed, the juice squeezed out contains in solution saccharose (cane sugar), reducing sugars, including dextrose, fructose, gummy bodies, salts of organic and inorganic acids—the latter mainly salts of potash, colloidal proteins, colouring matters together with suspended particles. Saccharose is the reserve food stored in the cane; but it travels about the plant from storing tissues in the transformed form of dextro-glucose. So when fully mature and ripe canes are crushed and the juice is boiled, greater proportion of crystallizable saccharose is obtained than from growing canes. If the juice is boiled to dryness, crystals are formed at the bottom, known as *sarkara* and crystalized lump as *sarkara-khanda*=sugar candy. *Sarkara*=Pers. *Shakar*=Ar. *Sakkar*=Gk. *Sakchar*, *Sakoharon*=Lat. *Saccharon*=Russ *Sakkaru*. *Khanda* means a torn piece, originally derived from crushed sugar cane. *Khanda*=candied sugar=Pers. *qand*=Ar. *qandi*=Sp. *candi*=Eng. *candy*=sweet confection. Sassanians introduced the sugarcane culture in Gundeshapur in Persia from India in 4th century A. D. Sugarcane was chewed by lovers in India as mentioned in Atharvaveda. In Gupta period sugarcane wine (*sidhu*) was manufactured. Sugarcane was cultivated in Indo-China, Malaysia in first century A. D.

Nestorian Monks at Gundesapur in Persia learnt about 600 a new process of refining boiled sugarcane juice. In 641 A. D. the Arabs defeating the Sasanians introduced the sugarcane culture in Egypt and adopted a new process of refining which produced the purest kind of sugar. And this is known in India as *miseri* after the (the land of the Egyptians (*El Miser*) who invented the process. The sugar manufactured after the Chinese process of refining introduced and imported into Bengal was known as *cini* after China. The molasses may be converted into alcohol; excellent fertilizers in alkaline soil. Yeast may be cultivated rapidly in molasses, dehydrated and compressed into a very valuable nitrogenous food of nutty flavor, particularly a desirable addition in a vegetarian diet. It is likely that by hybridization of *S. Arundinaceum* with *S. Spontanum*, sugarcane was originally developed in India. Both these grasses are sacred to the Hindus. *S. Arundinaceum* is known as *sara*. It covers large tracts of the Punjab. It is said that war god Kārtikeya was born in a *sara* grove (*Saravanodbhava*, *Sarajanma*). But when the *sara* grove burst into flames, the gods implored the aid of the divine nurse Kirtikā (Pleiades) to take care of the baby. Kārtikeya is associated with *sara*, for its culms were used to make arrows, tipped with copper or bronze. The Hindus use still the internodal parts of the culm of this elegant sweetish tall grass with white plumes for making pens and handles of paint brushes. Its stems may be utilized for making high class writing paper. Munj (Munja) fibre is made from its leaf sheaths, which is twisted into a girdle in Upanayana ceremony. The leaf blades are used for thatching houses and making paper. Possibly boiling the stem, hard crystalized sugar gravels (*sarkara*) were made. *S. spontanum* known as Kusa, grows in low-lying lands where it throws off its snowy white pubescence and flowering stems often 12 feet in height. The grass is large and fibres were made from it as from Munja which are similar and woven into Kauseya fabrics as from *ramie*; coarse mats, twisted into ropes or used as a thatching material. In Vedic times the dry grasses were used for making beds to lie on or for making soft cushioned seats. Its mats are still used as seats in Brahminic ceremonies and even feasts. Munj mats are superior and they are proof against white ants. Munj and a

small quantity of sugar are still added to make vinegar (*sukla, sautika*) out of molasses. *Boehmeria nivea* (*Kusa* - ramie grass; Ass. rhea; Chin. Chuma) fibres were woven into *Kauseya* fabrics. The fibre differs from flax, hemp, jute, in peculiar pectic substance which holds the strands together, and is not easily broken up by bacteria in retting. It is to be removed by a de-gumming or de-corticating machine. Once it is decorticated, it is a very valuable fabric. It is light and warm during the winter; it is cool in the summer, absorbing perspiration. It is silky in lustre; it has the elasticity of wool and silk, and flexibility of cotton. It has high tensile strength, and is very durable. Instead of losing strength when wet like many fibres, *Kauseya* rather becomes stronger when wet than dry, and it dries far more quickly than cotton or linen. *Borassus flabellifera* (*palmyra* palm - Tala, Sitā's breasts are compared with tala fruits; Rām Aranya 46) is a native of Africa. From Babylonia through shores of the Persian gulf it reached Bombay and Madras coasts and are found up to the Gulf of Siam. *Borassus* appeared in Bengal in fifteenth century and by 1676 became well-established. *Borassus* is an introduced palm in India. Rām (Sundara, 1) refers to a tree from which *sura* (toddy) oozes spontaneously. This toddy is the *amrita* which the Suras introduced from Asuras (Assyrians), that is, learnt the art of toddy making. The sacred texts were written on *Borassus* leaves cut into rectangular slips and a hole punched in the middle by means of which they were threaded into books. Birch birk leaves were only used for writing magic formulas to make amulets. The fan of the Buddhist priest is of *Borassus* leaf. The petiole makes the handle, and the blade is trimmed to shape. It is still the common fan. The most important uses of *Borassus* are however toddy and sugar-making. The tapper climbs the palm at the sign of its flowering. The inflorescence is beaten and crushed. And it is sliced off and the exposed surface is so fixed as to dip into a vessel. Twice a day, the expert tapper climbs the palm, cuts off a fresh slice and carries away the juice daily for about 5 months. For sugar making the vessel is coated with lime to delay fermentation. And if the fresh juice is boiled up to the moment of setting and poured into vessels to cool, it makes brown cakes of

sugar (79.13 sucrose); but if boiled until concentrated and left to stand for months, sugarcandy crystallizes out. As deliquescent salts invariably gather moisture from the air, rice flour is sometimes mixed with sugar to keep it dry. If the juice is kept in open vessels for sometimes, it ferments into toddy-tāri. But if the vessel is sealed long, by fermentation it is converted into vinegar. Toddy varies in strength as to its alcoholic contents in the process of fermentation. But if it be distilled, palm-wine (arak) is manufactured. There are soft tissues under the outer skin of the fruits which can be extracted and eaten in various preparations. The three seeds within the fruit when immature have a lining of gelatinous endosperm and a little cool water which may be eaten and drunk. The endosperm contains about 93 p. c. water but in its gelatinous portion glucose predominates, followed by saccharose. With maturity seeds harden like stone. But if they are buried for 2 or 3 months underground, seeds germinate and young seedlings may be eaten like fruits after the nuts are cut by a heavy knife. *Corypha umbraculifera* (talipat palm-tālipatra-tāliśa), a tall fan-leaved palm of Ceylon and Malabar coast, and common along the coastal region of Madras, Bengal upto Philippine Islands. It grows about 35-40 years and all the palms of its generation flower at the same time and after their seeds ripen, the palm dies. The leaves are very large, often 10 feet in diameter and made into baskets, mats, fans, umbrellas, and strips may be utilized as writing materials. During the time of growth of the palm up to 35 years, it stores a vast quantity of starch in the soft interior of its trunk. Sago of reddish colour can be made from stem when approaching the flowering time. At this time tapping is also possible for sugar or toddy. According to Hoernle palm leaf manuscripts from 450 to 16th century are inscribed with iron styles on leaves of *Corypha* after which period *Corypha* is displaced by *Borassus*. *Phoenix dactylifera* (date-kharyura, Ram. Aranya, 15) has been a cultivated tree of the dry belt from Senegal. Its fruits are very valuable, rich in sugars, and almost still the staple food of the Arabs. The ancients made a fermented liquor by macerating the fruit. A saccharine juice for toddy and sugar may also be obtained by tapping the date palm, but it is seldom done to damage a valuable plant like date. Oil may be pressed from its seeds.

Leaves are made into matting. There is Coumarin in fresh spathes, and an agreeable perfumed water and attar are distilled from them. *Phoenix sylvestris*, distinguished from *dactylifera* by the absence of root sucker is indigenous in Bengal, on the Coromandel coast and Gujarat. It is usually tapped for its sap to manufacture sugar. It produces a very poor quality of dates. *Flacourtia indica* (tamala) is a shrub with berry like fruit, extending from Eastern India through Siam into Malaya, Java and Philippines. Its wild fruit is sourish and astringent. But the fruit of *F. Jangomas*, a small spiny tree, cultivated from the Himalayas to Malaysia, produces excellent sour sweetish fruit which can be eaten raw.

Citrus originated in rather dry climates from plants which in order to nourish their seeds became possessed of water-storing hairs within the fruit cavity. By natural selection plants producing greatest quantity of water-storing pulp, either containing delicious sugars or acids with flavours have been developed. *Citrus medica* (lemon from Arabic *limun* - Hindi *limbu* or *nimbu*; Skt. *turanj* - Pers. *turanj*. Skt. *Vijapura* from *Vijauri* in Kafiristan which Baber in 1519 mentions as famous for its citrons) is indigenous of Media or of very ancient cultivation. It reached Iran before the time of Achaemenides. Alexander's officers found that the juice of *Medica* was used by the Persians mixed with wine to expel bile and poison; and its juice was used to make the meat digestible and to perfume the breath. Caraka and Susruta called it *matuhunga* and regarded its juice as medicinal in hepatic troubles. During the Gupta period its skin was chewed to cover the smell of wine after drinking and to perfume the breath and to prevent belching after meals (Kāl, Māl, 3). Lemons are now extensively cultivated all over the country. *C. limon* resembles *C. medica* in having buds tinted with red and thick rind, but differs in having the leaf blade jointed to the leaf stalk. *C. acida* is Kāgazi nimbu, indigenous in the warm valleys of the Himalayas. *C. aurantifolia* is the sour lime. *C. limetta* (*madhu karkatika*) is the sweet lime, indigenous of the Nilgiri Hills. *C. sinensis* is the orange, indigenous to western China. It was called by the Persians *narend* who introduced it in their country. Arabs called it *naraunj*. From the Persian, Hindi *naringi*, Skt. *nagaranga* and Sp. *naranjo*;

Port. laranga, It. arancio, Fr. oranger and Eng. orange have developed. It is sometimes confused with *C. aurantium*, the bitter Sevilla orange which is used for making marmalade and not for eating. This orange reached Spain in 9th century and sweet orange much later. It grows now in northern India and in Guzerat (Mozambique). This orange is now cultivated in California and Florida. *C. nobilis* is the Chinese Mandarin orange (tangerine) with thin easily moveable skin and sweet juice with fine flavour. It is cultivated extensively in Sylhet, Nagpur and Coorg. *C. maxima* (Pomelo, Shaddock-Skt. *jambhira* Va. 15. 3) is a native of Indo-China, Siam and Malaysia. The fruit may be as heavy as 3 kilos with pleasant sour sweetish taste in fine cultivated varieties, the pulp being either white or red. It reached Bengal from Batavia for which it is known as *Batavi lebu*. Bombay variety is better. The Spaniards introduced it or its hybrid in Florida in early 16th century where it is known as grape fruit (*C. paradisi*). A fragrant oil may be extracted from the citrus rinds, and a delicious perfume from the flowers by enfleurage. Citrus fruits are rich in citric acid and in antiscorbutic vitamin C (ascorbic acid). O. 5 mg. of ascorbic acid is found in lemon per kg. O. 8-09 in orange, O. 04 in apples, O. 03 in tomato, O. 1 in potato, O. 25-0. 5 in cabbage.

Eugenia aromatica (Clove-Lavanga in Charaka and Ramayana from Malaya *dwaga* (variegated) *lavang* (flower), a small-sized tree, is a native of Moluccas. Its dried flower bud (clove) was known to the Chinese as Chingkeh and the courtiers in the time of Han dynasty (102 B. C.-180 A. D.) were enjoined to hold cloves in their mouths in the presence of the sovereign to sweeten their breath. Early in the first century it became an object of trade at Alexandria in Egypt and passed forward to Rome. In fourth century clove was popular in the Mediterranean region. The fruit of the clove tree is far less aromatic than the flower buds which are an agreeable aromatic stimulant, antispasmodic and carminative. *E. cuminum* or *jambolana* (Jambu, from which Southern Asia was called Jambudwipa in Itakas), a fruit tree, producing a black astringent plum, growing wild in India ascending the hills up to 6000 feet and in Malaysia. The fruit is eaten mixed with sugar. Wines and vinegar are made from its pinkish pulp. The powder of its seed is given in

diabetes. It is said that it contains a glucoside (antimelline) similar in action like insulin. A sherbet is made out of its pulp. *Diaspiros ebenum* (ebony tree) is a large tree of Ceylon, S. India and Karnatak. Its black heart wood weighs about 86 kilos per cubic foot; the wood is much appreciated for ornamental furniture, piano keys, Chinese Chopsticks. *D. embryopteris* (tunduka; Beng. gāb from Siamese *plāb*), a dense evergreen tree, is found throughout greater parts of the country, Siam, Java and Celebes in shady wet places. The unripe fruit contains much gum and tannin, which are extracted by pounding the fruit in a mortar. This gummy product is used as a preservative of beams, and fishing nets are tanned and toughened with it. In ripening the fruits lose their astringency and they are eaten. Seeds yield an oil. *D. kaki* (persimmon) is a small tree grows in Khasia Hills, Java, and Japan. Ripe fruits lose their astringency. The Chinese often dry the fruit like figs. It has 2 almond like stones. But Javanese variety is seedless, and the ripe fruits possess a beautifully golden yellow colour and pleasant sweetish taste of apricots. A fine preserve is made from it. *Ficus bengalensis* (*bata*), a wide spreading large tree, well known for its descending roots, is found all over the country. *F. carica* (*Smyrna fig*) is found in Egypt of 4000 B. C. From Egypt it was introduced into Iran known as *anjir*. From Iran, it spread into Afghanistan, Baluchistan and Kashmir. *F. glomerata* (*udumbara*, *yagna dumara*), a large tree, is found on Salt Range, Sub-Himalayan tract from Kashmir to Assam and Bengal. It bears large fruits which are eaten ripe. Its unripe fruits are cooked as a vegetable. It produces a viscid latex, containing 4.9 p. c. caoutchouc and 95 p. c. resin. *F. religiosa* (*asvattha* Av.), a native of Sub-Himalayan tract, Salt Range, Central India, Bengal, begins life epiphytically and strangling its host or on old buildings, its far growing roots extending down to the ground and establishing it as an independent tree. Gautama attained his Buddhahood under the shade of its tree at Buddha Gaya. In 288 B. C. Mahendra transplanted its branch in Anuradhapur from which all the plants of Ceylon have originated. It is the sacred tree of the Buddhists. *Feronia limonia* or elephantum (*Kapittha* - Av. 4, 2, 18 for virility, wood apple), a small tree of India. The fruit pulp is made into sherbet to be drunk as a stomachic

stimulant, mixed with sugar as it is acrid and full of small seeds. A fermented wine was made from its pulp. *Madhuca* (*Bassia*) *latifolia* (*Madhupa*, Av. 1, 84, 5; Hindi, *mahua*) grows in Northern India and *M. longifolia* is found in south-eastern India and Ceylon. Both trees flower freely. The flowers are rich in honey, and are used for sweetening food, for making sugar and for making fermented liquors and acetone. The seeds yield oil (*illipe butter*) which is used in food, as a substitute and an adulterant for *ghi*, for soap and candle making. In the seeds however there is *sapo-glucoside* (*mowrin*) which if injected into the blood causes death. But when eaten by animals, it does not prove poisonous to them. *Artocarpus integra* (*panasa*) is a large tree of very ancient cultivation, and indigenous of the country. The tree may be 35 feet high and bear fruits at 3 years. The fruits grow to an enormous size, exceeding even 10 kilos. The ripe pulp of the fruit is sweetish, but has the flavour of ethyl-butyrate. It is laxative. The starchy seeds can be boiled, roasted, mealled and eaten in various ways. The heart wood of the tree has a bright yellow colour which is appreciated by the Buddhists, as it is noted for durability and fine polish. *A. communis* or *inoiss* (Bread Fruit), a native of the South Seas, is cultivated in S. and W. India, Ceylon and Burma. But it can not stand the winter of Bengal. Both seeded and seedless varieties are found. The fruit flesh of the seeded ~~fruit~~ is not much eaten. But the seeds taste like nuts, roasted, fried or boiled. The fruit flesh of seedless varieties is eaten shortly before it is ripe. It may be sliced, and baked or boiled and it tastes like potato. But as it is laxative, it should be boiled in two waters. The wood of this tree is yellow and resists white ants. *A. champedan* is met with in Eastern Bengal, Assam and Burma. Its fruit much resembles *Panas*, but it is smaller and narrower. The rind is thinner and the flesh is more juicy and aromatic, and when ripe, of dark yellow colour. The seeds can be eaten either boiled or roasted. The fruit of some races is edible as a vegetable before it is ripe. It may be sliced and baked or it may be boiled in which condition it tastes like potato. *A. lacoocha* (*lakucha*—*dayuā*), a fig tree, is found in Kumaon, East Bengal, S. India, Ceylon and Burma. The fruit is eaten. A yellow dye can be obtained from the wood which is used to dye

the garments of the priests. *Spondias cythera* (Beng. Belati Amrā), a medium-sized fruit tree of eastern Pacific and Java, now grows in Bengal being introduced by the Dutch. The fruit may be as large as a duck egg is pleasant to eat when stewed. The fruits are also excellent for sauces, preserves and jams. *S. spinnata* (Amrataka; Beng. amrā) is indigenous from India to Malaccas. The fruits are acid, and pickled. Pulses are soured through its young fruits.

Tamarindus indica (Ar. tamare hindi - date of India; Amla), a large tree growing to the height of 80 feet of India and of Africa, south of Sahara. But it is not known that it was cultivated in Egypt in early times. The pulp of its pods contains tartaric acid (8 to 10 p. c.) with potassium bitartrate and about 80-40 p. c. sugars. After gathering, the ripe pods are first stripped of their outer shell, and seeds are removed from the pulpy contents. The pulps are mixed with salt or sugar or both for preservation. If the pulp is boiled with an equal amount of sugar, jam is made. If the pulp is mixed with salt, pepper and mustard paste, a pickle (Beng. Kiseanda) is made. Seeds contain about 68 p. c. carbohydrates, 14 to 18 p. c. proteins and 1, 5 to 6.5 fats. The de-husked kernel contains nearly 60 p. c. pectin which can be utilized in making jellies. The pulp is laxative. The outer skin of the seeds containing tannic acid is removed by roasting and soaking. Then the seed kernel may be roasted and made into a starchy flour, or starch extracted from it. Seed kernels may also used as food, by boiling or frying them. The tender seedlings may also be taken as a vegetable. The heart wood is very hard, but not durable if exposed to weathering. *Bouea macrophylla* (gandaria), a medium sized tree growing from north-eastern India to Maluccas up to 10-20 m. height, produces a juicy fruit of sourish and sweetish variety with a faint smell of turpentine. They are either eaten fresh, or savoury pickles are made of the half ripe fruits.

Averrhoa carambola (Kamarangā), a wild plant of Java, is cultivated in Malabar and Bengal for its pleasant sub-acid fruits, which can be eaten raw and also excellent for tarts. Baber in 1519 praises it in the name of *kermerrick*. In 1610 it was found cultivated in Goa. *Garcinia xanthochymus* (tamala, an evergreen tree of E. Himalayas, E. Bengal, S. Canara, Coorg,

Nilgiris, Burma into Siam. It is cultivated for its pleasant acid fruits which are eaten and made into sherbet. Immature fruits yield a good deal of gum resin. The bark dyes cotton black. The timber is durable. *Coccinia* (or *cephalandra*) *Indica* (bimbi) is a climbing herb of tropical Asia and Africa with small reddish fruits. Young shoots and fruits are cooked in curries. Ripe red fruits are candied. *Spinacia oleracea* (spinach-palong), a succulent leafy vegetable, was cultivated in Iran in 1st century. It was introduced into Europe in 11th century. From Europe it has been introduced into India in the 19th century. It is appreciated as a vegetable for its rich iron and vitamin contents. *Hiptage madagabola* or *bengalensis* (Madabilata), a native of the plains of India and Malaya, where it is cultivated as a garden flower, is a large evergreen scandent shrub reaching a height of 12-15 ft. It is attractive when in full bloom with profuse trusses of white and yellow fragrant flowers in large terminal and smaller axillary panicles, borne on short spikes. It looks fine on a strong trellis or as a screening material. It flowers between February and April.

Santalum album (sandalwood: candana forests adorned Malavakula hills and the islands of Kaveri: Ram. Kish. 41) is a small parasitic tree which draws a part of its nourishment from the roots among which it grows, numbering above 70 species. *S. Album* is a small evergreen tree growing in the dry region of South India; eastern Java along the Chain of lesser Sanda Islands to Timor; the adjoining parts of New Guinea, northern and eastern Australia. Very closely is the genus *Eucarya* which occurs in west and southern Australia where *E. spicata* is the source of West Australian sandal oil. This oil however has not the exact smell of tree sandalwood oil, as their chemical compositions are not identical. But the Malayasia area of *S. Album* borders in a natural way, while *S. Indian* area is detached, thus indicating its introduction in the new habitat, though of very ancient times. Sandalwood trees are felled and cut up into billets. Then white sapwood is removed as it lacks the scent. The heartwood is rubbed on stone with water to make a fragrant paste which is used as a very popular cosmetic. The wood is comparatively hard, very close grained, and oil in it preserves it. For its pleasant aroma the wood is used in making dainty toilet

articles. Fans are made out of it. The wood is distilled for its valuable oil. The oil contains 90 to 98 p. c. sesquiterpene alcohols and A and B santalol. It is used in perfumeries. Taken internally the oil acts as a stimulant and disinfectant in the urinary genital organs. *Pterocarpus santalinus* (Red sandalwood - *rakta candana*) grows in Cuddapath, N. Arcot and Karnul. The wood is inodorous. But it has a red dye. And made into a paste either with or without white sandalwood, it makes a pretty rose tint on the forehead. The timber is used for house posts as white ants do not attack it. *P. dalbergoides* is the Paduk of Andaman Isles. It has a reddish timber, very strong, heavier than teak, and twice as hard. *P. indicus* is a native of Malaysia. The timber is moderately hard and heavy, yellow to red, fragrant with rose like odor, sometimes resembling sandalwood scent. The wood is made into various kinds of furniture. The fragrant flowers are highly prized. It has been introduced into Burma. *P. macrocarpus* (Burma Padouk) grows in Karen Hills, producing hard and strong wood. *P. marsipium* (Indian Kino) is found in Kumaon Terai, hills of Bihar, Central and S. India and Ceylon. The wood is durable, takes a fine polish and is used for making furniture, window frame, rafters and beams. In N. Malabar a kino is collected from its juice by tapping, and the kino is used as a tanning material. *Garcinia cowa* is a tall evergreen tree occurring in Eastern Bengal, Assam and Burma as far as Siam. The bark contains a yellow resin, insoluble in water but with spirits of turpentine produces a light yellow permanent varnish. The fruit (Beng. *cowa*) which is of the size and form of a small orange ripens in June and is acid in taste, but makes a very fine preserve. The timber is hard but not of first class. *G. gambogia* (hila) is a small evergreen tree of the western coast and Ceylon, ascending to 6000 feet on the Nilgiris. It yields an adhesive yellow resin, which is insoluble in water but makes a fine yellow varnish when mixed with turpentine. The fruit ripens in the rainy season and is of pleasant acid taste; the rind of the fruit is used as a condiment and used in fish curries and dals in place of tamarind. *G. indica* (kokam) is a slender tree with drooping branches, thriving in the lower slopes of Nilgiris, in Coorg, Kanara and Konkan. The fruit is called wild mangosteen. The dried fruit is used as

a condiment and in acidulous drinks. From the seeds of the fruit an oil is extracted, known as Kokan butter of transparent light yellow colour. It is used in the adulteration of ghee. *G. mangostana* (mangosteen), an evergreen tree, is indigenous to Molucca stands. The region of its cultivation of mangosteen extends through Malaysia and from thence northward to Moulmein in Burma and into lower Cochin China, Java, Nilgiris. It fruits usually after 15 years. The snow white pulp on the seeds is delicious with a delicate flavour. But the fruit does not keep more than a few days; rind contains 7-13 p. c. tannin. *Dioscorea* (yams—Beng. *matialu*) belongs to a large genus of herbaceous climbers with underground storage organs which by the food held in them enable the plant to renew annually a vigorous growth. These storage organs (tubers) if thrust deep into the ground are protected against hogs and wild animals above the ground; if superficially on the ground by a covering of thorny roots or poisonous substances. Even many cultivated forms have more or less irritant action. *Dioscorea alata* (white yam—Beng. *Ol*) is found in deep forests of Indo-China. Now it is extensively cultivated in tropical countries; in India all over the country except in Rajputana. During the season at growth of 10 months it may be formed up to 60 kilos, but usually about 5 kilos. The tubers are starchy, but somewhat sticky. Water in which the sliced tuber is cooked should be thrown away, as it is likely to contain irritant substances, or the sliced yam may be kept overnight in cooked rice water to remove its acidity. Dry tuber contains about 65 p. c. starch, 8 of protein and 1 p. c. of fat. It may be converted into meal and kept for a year, and biscuits may be made, mixed with rice or wheat flour. *D. bulbifera* (yam producing bulbils) is common on the hedges of Malayasia, Burma and India. Tubers are round, not larger than a man's fist. It is very irritant and is hardly edible unless repeatedly boiled and washed in running water between each boiling. *D. fasciculata* is grown in Bombay, Bengal and Berar. Its starch is very little irritant. *Papaver somniferum* (opium—*shiphena*, *Susruta*), a native of Asia Minor. Ancient Greeks were used to sprinkle its seeds over cakes. Its capsules, stems and leaves were employed by the Greeks in the preparation of an extract, called meconium.

(Hippocrates) which was used as a soporific drug and in the preparation of a soothing beverage like *kuknar* of Akbar's time and *posi* of modern Punjab. The inspissated sap was called by them *opion*, from *opos*—juice. Theophrastus in 3rd century B. C. describes that *opion* is obtained by scratching the green pods of *Papaver somniferum*. Virgil and Pliny praised its medical value. Galen called it a sovereign remedy against dysentery. The Arabs from 9th century spread its fame to Persia, North India and China, based on Galen as an authority. Arabs called Gk. *opion* as *apyum*, which became *afin* in Hindi, Skt. *shiphena* (snake venom), and Chinese *yapien* and *afonyong*. The early trade of opium passed into Arab hands after the Roman downfall. Arabs and Persian sailors employed by them took *afyum* eastward. The supply of drug reached Arabian and Persian coast by ~~sea~~. Babar does not mention opium (1519), but Abul Fazl mentions poppy culture in Malwa, in Akbar's time. It is said that the Chinese learnt to smoke opium in the time of Kublai Khan (1279-94). The Greeks praised the value of poppy seeds as an article of food and affording oil (about 30 p. c.) before they knew the narcotic effect of its capsules. *Dryobalanops aromatica* (Malaya *pakok kapur* Barus—camphor trees of Barus in Sumatra; *Kapur*, *Kapuram*, Arab. *Kafur*; *Apakva karpura*; Hindi *Kapur*) a very lofty tree, often 200 feet high, is found in Sumatra, Borneo and Johore. The trunks of the tree may possess a clear length of 90 to 125 feet and a girth of 7 to 35 feet. The wood is moderately hard and heavy; given a good polish it resembles mahogany. Camphor accumulates most in the cavities of the trunk, as a crystallized form of oil which is found throughout the permanent parts of the tree. It is not chemically identical with that of *cinnamomum*, though very similar, being principally *d-barneol*. Camphor is sought in the forest at the personal risk of the hunter from predatory animals and fevers. When a likely tree is found they hack a hole in it to test the presence of camphor by means of its smell. There was a great demand for this camphor by the Chinese before the camphor industry was developed. Arabs traded with it in sixth century A. D. and brought it to Europe; possibly to India; or India got this natural, not

distilled, camphor (*apakva karpura*) from the Chinese who got it from Malaya up to 8th century A. D. The Portuguese snatched the camphor trade from the Arabs in 1501 when they began to dominate the Indian Seas. The Malays use camphor in the ceremonial purification of a corpse. An oleo-resin (oil of camphor) is obtained by cutting a hole in the tree into which it drains. It can also be obtained by distilling its wood. *Cinnamomum camphora* is a stately tree of southern Japan, mid-east China, Tonkin and particularly Formosa. In ninth century A. D. the Chinese and Japanese learnt to manufacture camphor from distilling its wood. Camphor is formed in oil cells which occur in all parts of the tree. They fill with a clear yellow oil in which the camphor gradually forms. When young parts are distilled, the oil is obtained, containing more or less camphor which can be separated by decanting. This manufactured Chinese and Japanese camphor (*pakva karpura*) has practically monopolized the camphor trade. In India recently *C. camphora* has been introduced in Nilgiris, Dehradun and Shaharanpur. *Blumea balsamifera*, a plant 12 feet high, is found in Siam, Celebes and Philippines. It smells strongly of camphor. Malayese manufactures camphor out of it by distillation. They and the Chinese appreciate its warm stimulating and sudorific effects. *Mallotus philippinensis* (*kamalā*) is a widespread small tree found, from N. W. Himalayas throughout India to eastern Australia. The glandular hairs of the fruit which are intermingled with stellate hairs contain a pretty dye of red brickish tinge. The coloring matter varies from 1.4 to 1.7 p.c. of the weight of the fresh fruit. Boiled with alkali, particularly alum, on silk and wool it imparts a beautiful golden red. It contains rotilerin, wax and resin. It is anthelmintic, but a purgative, producing nausea and griping. *Solanum melongena* (*brinjal-bārtaku, begun*) is a native of western Bengal and Malay where they grow wild. It grows now all over India. Persians carried it to Iran, Egypt. The Arabs took it to Spain. And the Spaniards have taken it to America (eggplant). Young sliced fruits are fried or curried. *Hibiscus abelmoschus* (musk seed, musk mallow—*lata kasturika*), a herbaceous bush, is found in the hotter parts of the country. The stem

contains a jute like fibre. Its seeds are scented of musk. The musky scent of the seeds reside in the seed coat and may be brought about by rubbing the seeds. They are placed among the clothes to perfume them and to keep insects and moths away. The seeds contain a little fixed oil—the musk seed oil—the chief constituent of which is palmitin. The fruit is demulcent and diuretic. The Arabs traded in the seed *hab-el mishk* from which the abelmoschus has been derived. Arabs carried to Egypt. And medieval Europe used to receive the musk *mus* from Egypt principally. Spaniards have carried them to tropical America. *H. cannabinus* (Deccan hemp, Ambari hemp) is indigenous of S. India, especially of Deccan and Karnatak. The stem contains a fibre which is shorter and less flexible than jute, but stronger, more lustrous and durable. It is used for making ropes, fishing nets and canvas. The seeds contain a clear yellow drying oil about 20 p. c., used in paints and making linoleums. *H. esculentus* (ochra—Hindi bhendi) seems to be of African origin. The Portuguese introduced it in America with an African name in 16th century. It is cultivated now in all tropical countries. Young pods are used as a vegetable. They are boiled, fried or used to thicken soups. The carbohydrates in them such as starch and sugar, range from 4 to 12 p. c. The oil from the seeds (20 p. c.) is edible, containing palmitin and stearin. The mucilage of the seeds is demulcent. *Cannabis sativa* (Hemp—Vedic Soma, identified with bhanga, Rv. 9,61,13; Av. 9,34,85; Susruta—Chinese *sima* (great or male), *tauma*, *chuma* (seed-bearing or female)—Mughul *sohama*;—Tanjut *dehoma*;—Av. *haoma*—Ger. *hanf*) is a native of Caspian region, S. Siberia, Turkestan and N. Persia. In Iran, Kashmir, N. India and China it is of very ancient cultivation. It was introduced into Italy into the Roman period. Galen of Pergamos who died about 200 A. D. says that it was customary to give hemp seeds to guests to eat to promote hilarity. Herodotus mentions that Scythians shouted joyously while in their fumigation baths. Scythians intoxicated themselves with the smoke of the seeds of the hemp. In Persia the seeds are called *sahadanak*—imperial seeds. The hemp seeds are rich in blood-coagulating vitamin K. Seeds are intoxicating

if the volatile narcotic present on the seed coats and adhering particles of inflorescence are not carefully removed. The intoxicating and narcotic principle in the plant is not found when the plant is very young or male; but begins to form with the growth in female plants and reaches its greater abundance when the flowers appear with resins. But it gradually diminishes as the leaves pass maturity. Resinous tops and resinous coating of the seeds are the real intoxicating parts. The flowering shoots, fresh or dried, are made into paste, and mixed with other liquids are used as exhilarating drinks (*siddhi*); if smoked, it is known as *ganja*. The resinous substance that appears spontaneously on the leaves, stems, inflorescences and fruits, when cultivated in cold and dry regions is the active principle, known as *charea*. It is the longhng leaf (*gelotophyllis*) of Pliny which came from Bactriana. The hemp stems supply fine fibres by retting, and cleaning and they are made into ropes, shoes and hampan garments in Garhwal (*tsaks*), Kumaon, Nepal and Kashmir. Hemp seeds when expressed yield 15 to 20 p. c. greenish yellow oil of disagreeable flavour but of good drying qualities. The active principle is cannabinol=phenolaldehyde. It is a cerebral stimulant, and analgesic. It is useful in chronic inflammatory uterus, diabetes, bronchitis. It reduces peripheral sensibility, so prolongs copulative durability. *Crotalaria juncea* (*sana-sana* hemp) is of very ancient cultivation, of India, if not indigenous. Out of *sana* fibres *pavitra* (sacred) threads are made (*Manu*). Strongest and finest fibres are got from plants that are not dead ripe, particularly of Bombay, if retted for 24 hours in running water. Fibres are made into fishing nets, ropes, and died red into bridal garments. *Linum usitatissimum* (linen, flax-tisi, *atsi*, *kshuma*). *Manu* (241) says that the garments of students should consist of skins above and of fabrics of hemp (*sana*), of linen (*kshuma*) and wool. Brahmin traders should not sell dyed garments of hemp (*sana*), linen (*kshuma*) or of wool (*Manu* 10,87). It is one of the oldest cultivated plants. Its native home was Levant. This has been cultivated for at least 4-5 thousand years in Mesopotamia and Egypt; and is wild in the area between the Caspian and Black Seas. The

Flax introduced it into north of Europe; and Western Europe by the Keltic Aryans; and into Iran and India by the Eastern Aryans. *Linum angustifolium* with fewer and narrower leaves was cultivated by the inhabitants of the Swiss lake-dwelling Kelts; is found wild in S. and West Europe including England, north Africa and Western Asia. A confection made of flax seed and honey was called Golden Sweet. Poppy, flax and sesame seeds were put on bread by the Greeks; Athenaeus (8.111). It grows all over India. Its fibres were used for making bridal garments, dyed red. Its seeds produce the drying linseed oil, used in making paints and linoleums. *Gossypium* is cotton—*Karpasa* in *Avalayana Srauta Sutra*. Cotton cloth has been found at Mohenjodaro of about 2700 B. C. The principal textile of the people of the Mediterranean region was linen. When Alexander's soldiers clad in linen and wool and his auxiliaries overran Persia and Turkestan, they were surprised to see wool (cotton) was growing on plants, obtained not very long ago from India. Alexander introduced Indian cotton clothes into southern Europe, *Gk. karpases*, Lat. *carposae*. Herodotus no doubt wrote in 450 B. C. that India had wild trees that bore fleeces as their fruits. But it was regarded as a vague idea. Theophrastus (350 B. C.) says: "The trees from which Indians make clothes look like dog-rose. They set them in plains arranged in rows (cultivated), as to look like vines at distance." Pliny tells us that cotton (*carbons*) in Tylos was called *Gossympines*, from which the botanical name has been fashioned. In the *Periplus of the Erythraean Sea* (63 A. D.) it is mentioned that Arabs carried cotton (derived from Arabic name *Katan*) from *Patala*, *Ariake* and *Borygacce* (Broach) up the Red Sea to *Adull*". Cotton textiles of India, especially the printed fabrics, became fashionable with the Roman ladies. Cotton garments have been found in Khotan from 3rd to 5th centuries. India at that time had the monopoly of spinning and weaving cotton. The demand of Indian muslins and calicoes was so great not only up the Red Sea and the Mediterranean where the wearers of linen clothes prized and purchased them, but even across the Bay of Bengal to Malaya where the hemp wearers and silken dressed such as the

Chinese and wearers of bark cloth such as the inhabitants of Malaysia purchased them, that it attracted navigation and encouraged sea traffic across the Indian oceans. American cotton fabrics developed much later. American cotton species have 26 chromosomes while Indian and Asiatic species have only 13 chromosomes. The fibre or floss of cotton is produced on the seed coat. Each fibre consists of an elongated cell-hair which before the seed is ripe, twists spirally on its own axis a little, thus being flattened develops unevenness on its wall. These help in the binding process when spun. Between the long fibres on the seed, there may be very short fibres—fuzz. Long fibred floss has been the object of man's selection, but fuzz persists as a legacy from wild parents; it may be dissolved into sulphuric acid, pushed through glass tubes and made into good lustrous artificial silk. But seeds without fuzz have been developed in some south Sumatran and Dutch Indies species such as *G. obtusifolium* and *G. brasiliense*. Cotton fibres are hygroscopic, twisting and untwisting according to the varying atmospheric humidity. In some the power of absorbing moisture is greater than in others. The length of the fibre varies according to species, but not in different pods of the same individual plant. Cotton seed yields an excellent edible oil. Cultivated cotton fibres with exvolutions have been found at Mohenjodaro preserved by copper sulphate. The seed meal may be used in making plastics and gramophone records. *Corchorus capsularis* (jute—Kosta, possibly from Sanskrit Kosha, a sheath, as the fibres (patta—Beng. pāt) are around the stem beneath the bark, a herbaceous weed, found all round the world. This produces the greatest part of the jute of India, nearly 10 times to that of *C. olitorius*. This is the same species which is grown in Yangtze valley of China, particularly in Tientsin area. As it is cultivated in Assam and Eastern and Northern Bengal and it has no ancient history in India, it is therefore likely that it has been received from China. *C. olitorius* (nalitā—reed like or from nadikā) with glabrous leaves, except on the petioles and veins of the under surface and seeming larger flowers are cultivated chiefly in central Bengal. It is the ancient vegetable of Egypt and Levant. Pliny (78 A. D.) and Theo-

phrastus described it being used as a pot herb in Egypt and Levant. In Egypt and Levant it is still used as a vegetable, called *melokhia*, almost similar to *nālitā*. For eating in Egypt it is allowed to grow for 2 to 3 months. Possibly the *melokhia* clothes mentioned by Arrian and Pausanias were made of the jute fibre. In India and Malaya, its tender green leaves on the tops are eaten as a vegetable. It is likely therefore that this herb which can be used both as a vegetable and supplier of fibres to be woven into coarse clothes was introduced into India, China and in America from Egypt. *Amaranthus gangeticus* (Beng. *Lāl sāg*) is the tender pot herb that gives bright reddish tinge to any fish or vegetable that is even cooked with it. *Apium graveolens* (celery; Gk. *selinon*) is found in Egyptian 20th dynasty, woven into a garland. The Romans imitated the fashion. It is a biennial herb with edible leaf stalk and short root stock, used for flavoring vegetable and meat dishes. The volatile oil of the seeds—*apiū*—is used in perfumes.

Dillenia indica (Beng. *Chāitā*), a small tree, is found from eastern India to western Malaysia. The fruits which are produced in abundance, are enclosed in fleshy sepals of an acid flavour. They are eaten as a flavouring with curries. It contains tannic, glucose and malic acid and about 86 p. c. of water. The pulp of the fruit is used to wash the hair. *Lagenaria leucantha* or *vulgaris* (bottle gourd—*Alāva*—Mal. *Lābu*), a herbaceous climber with white flowers, of Egyptian origin, is now grown all over the country. The outlayer of these gourds is very hard. And tying up the young fruits, any shape can be arranged. Cutting across the neck of the ripe fruit, inside may be emptied by allowing it to decompose, and then smoking the empty shell over the hearth, it can be used as a water vessel, wine bottle and sound box for musical instruments. The ancient Egyptians cultivated this plant both as a vegetable and to furnish calabashes. It reached China before 1st century A. D. where both vegetable and calabash-yielding races are cultivated. It reached India through Persia possibly in 2nd century B. C. as it reached Malaysia with the Sanskrit name *lāva* early in the Christian era. The pulp of the fruit is used in curries, though insipid in taste. *Cucumis melo* (melon—*khārūṣā*) is of Egyptian origin, where however it is not found in the tomb older

than 1st century A. D. Melons were unknown to the Romans. Only towards its decline sweet melons reached Rome, which were appreciated by them. From Egypt melons reached Samarkand where sweetest luscious melons grew. From Samarkand, it reached Persia and Afghanistan. Indian melons were introduced by the Moghuls. A sub species of *Cucumis melo*, is *C. momordica* (plant) with cylindrical cucumber-like fruit, grown all over the country. *Cucumis sativus* (cucumber—*Kahira*) is of Egyptian origin. It is was in Egypt during 12th dynasty. It spread through the Mediterranean regions very early. It was known to the Greeks and then to the Romans. It reached Persia and North India early in 1st century A. D. and China about 6th century. *Benincasa cerifera* (Bang. *Chila Kumra* ; Skt. *Kushanda*) is a herbaceous climber. It has two varieties, one with hairy fruit and the other with a smooth fruit. As the heavy fruits need support it is customary to let the vines rest on any convenient roof. The tender leaves and fruits are eaten boiled in curries. *Amaranthus caudatus* (Love lies-bleeding—*Priyangu*), a relatively robust annual, hardly to be distinguished from *A. paniculatus*, for as cultivated plants of long standing are closely related, exhibiting considerable variability. *A. caudatus* is widely cultivated as a grain crop in Africa. *A. caudatus* and *A. paniculatus* are cultivated for grains in many parts of the hills of N. India. As garden plants, Love-lies-bleeding, both of them are cultivated all over the country from very ancient times for their clusters which retain their red colour when dried, having astringent and antihemorrhagic properties. *Aglala odorata* (*Priyangu*, Siamese *Prayong*), a bush wild in Indo-China and S. China where its flowers are used in scenting tea and perfuming clothes. *Acacia arabica* (Gum Arabic tree—*Vabhula*, *Babil*) grows in Sind, N. W. Provinces, Bombay and Central Provinces. The gum is often discoloured by the tannin it contains. It is therefore used more in calico-printing than in medicine. The timber is hard and durable. *A. catechu* (*khari* tree—*khadira*) grows in the drier parts N. India. *Catechu* is manufactured by boiling the tannin out of the chopped-up heart wood of the tree. It consists of catechin and catechu-tannic acid. It is chewed with the *pan* as an astringent. It is also used in tanning leather, and dyeing cotton and silk. *A. concinna* is a prickly bush found in

the jungles of India. Its detergent pods are used for washing hair, woollen and silken goods. *A. farnesiana* (cassia flower); Babla, a West Indian small tree, now naturalized all over the country, flowering freely with a pleasant scent, persisting even when the flowers are dried. The plant was grown in Rome in 1825 from seeds obtained in San Domingo. But in 1821 it was taken to Manila. From there the Dutch took it in all places in the tropics. It is largely grown in St. France on account of the rich perfume obtained from its flowers. *A. Jacquemontii* or *speciosa* (*sirisa*), a small handsome shrub with polished stems and thorns and sweetly scented flowers (*sirisha*), grows in N. W. Himalayas up to 8000 feet, Punjab, Sind, Rajputana, and N. Gujarat. *Sapindus mukorossi* and *S. laurifolius* (soap nut-phenila, Hindi ritha). The former is the soap-nut tree of Northern India and the latter of central, western and southern India. Their dried fleshy berries have been used from time immemorial as detergents of woollen and silken goods. And in Kashmir even to-day, in washing shawls, soap-nut is preferred to modern soaps. *Clitoria ternatea* (*aparsita* Av. 2, 27, 8), a climber with conspicuous blue flowers, grows throughout the country. It was taken from India to gardens of Europe about the end of 17th century.

Cuminum cyminum (cumin-*jiraka*) is an annual herb, native of Levant, from which Greeks and Romans got it. Persia got it from the same source. India and China got it from Persia. It is cultivated in N. W. and is used in seasoning curries. *Nigella arvensis* (small fennel-black cumin-*krishna jiraka*) is also an weed of Levant. Rome got it from Carthage. And Carthage possibly from Tyre. Arabs carried it across the Sahara. All through the Levant its seeds are sprinkled over bread like sesame for the flavour. Sometimes breads are baked with it, to impart flavour. From the Mediterranean region it reached Persia. From Persia it reached India where it is now extensively cultivated for seasoning curries. The seeds quicken the pulse and raises the temperature and stimulate the kidneys. Large doses may cause abortion, being an emmenagogue. *Foeniculum vulgare* (fennel). *F. dulce* (*anise-masuri*) is the cultivated sweet fennel. Anise is grown extensively. It is chewed to sweeten the breath. It contains about 80 p.c. of anethol. It is an agreeable aromatic and carminative.

Curcuma angustifolia is a native of Central Provinces and upper Godāvari. It is now grown all over the country. Its tubers yield a kind of starchy flour (Ben. tikbur), which is relished by children. *C. domestica* or *longa* (turmeric = haridrā Av. 12, 24, 2 = yellow wood) is a native of S. and N. E. India and Malaysia. Tang dynasty introduced its plantation into Yun-nan and Szechuan valleys. Its rhizome contains a yellow dye. But it is not fast. The Arabs used to trade dry turmeric to Europe and called it *kurkum*, for which it has received *curcuma* as its botanical name. In Malaya rice dyed with turmeric is displayed as a part of the ritual in wedding. In Siam turmeric water is rubbed over the body after a bath. Malays and Hindu brides take their baths after their body has been besmeared with fresh turmeric paste. Turmeric is astringent and carminative. The Hindus use it in their fish curries as a condiment. *C. mangga* or *amāda* grows in North-eastern India and in Malaysia. Its tuberous roots are bright yellow within and smell like that of mango (*amāda* = mango-ginger). It is used for flavouring as a condiment. *C. zedoaria* grows in Java, N. E. India and in Cochin. It is chewed in Bombay and Java and its decoction given after childbirth to women as a restorative. It is camphoraceous in its flavour. Arabs used to trade in it. Levant and Europe in 8th century A.D. *Citrullus colocynthis* (indrāyab, mākhāl) is a native of tropical Africa, Arabia, Western Asia and N. W. India. It is a creeping or climbing herb, bearing an orange like marble green fruit ripening into yellow. The pulp is intensely bitter due to amorphous glucoside colocynthin which is a drastic purgative. *Citrullus vulgaris* (water melon), indigenous of tropical Africa, was cultivated in Egypt as early as fourth dynasty. It reached Palestine early, known to the Israelites as *abattishim*. It reached China however in 10th century A. D. It may have reached N. India in 3rd century. The Water melons are grown all over the country to be taken during the summer as sherbet; those of upper and central India are the best (*farbasa*). *Olea europaea* (olive = Beng. *jalpat*) is of Mediterranean origin. It spread into Greece in 9th century and Italy in 6th century B. C. It was grown in Egypt. Persians brought it to Iran from which it reached India and China. Its fruits are eaten when ripe; if matured but green it is pickled; oil

is extracted from its seed meal. *Prunus amygdalus* (almond-bādam), a moderate-sized tree, indigenous in Western Asia; cultivated and improved in Persia whence it reached Afghanistan and Kashmir. *P. armeniaca* (apricot) is a native of Western China and cultivated in ancient Khotan; is cultivated in Lavant, Persia, Afghanistan and Western Himalayas. *P. cerasus* (cherries) is a native of Armenia. It is now cultivated in all temperate countries; India in N. W. Provinces up to 8000 feet. *P. communis* (plum-*alubuhkara*) was cultivated in ancient Khotan (Bokhara) and thence it was introduced into Persia. Now it is cultivated all over the temperate regions in Afghanistan and Western Himalayas from Garhwal to Kashmir 5000-7000 feet. Ripe fruits are eaten; being dried it is used in Chutneys. *P. persica* (peach), a native of W. China, was cultivated in Persia from which it reached Afghanistan and N. W. India. *Pyrus communis* (pear) is a native of Europe. Cultivated pears are found among the Swiss lake dwellings. Greeks and Romans cultivated it. It is now grown in Kangra valleys and Kulu Hills. A variety grows in Kashmir and Nilgiris known as Nāshpāti, but with hard flesh, and without the natural aroma. *P. malus* (Apple=Seb) is a native of Eastern Europe, is cultivated in Persia, Afghanistan and in Western Himalayas 5000 to 9000 feet. *Cydonia vulgaris* (quince), a small tree of Persian origin, was brought to the Western Himalayas by the Moghuls. *Vitis vinifera* (grape=Pers. angur). In very ancient times it began to be cultivated in the Mediterranean regions. The Egyptians in earliest times had grapes like Corinth currents. By the time of Caesars the cultivated races were numerous. It was introduced into China in 136 B. C. overland Persia. It reached Persia earlier and possibly Afghanistan and India, in 2nd century B. C. Probably India only got raisins (*Caraka Susruta*) from abroad. Turko-Moghuls introduced the vine culture. In Bower mas many medical prescriptions are found with raisins. *Nephelium litchi* (Hindi, Beng. *litchi*), a very handsome evergreen tree of S. China, reached northeastern India through the hills. It is cultivated for the abundant fleshy aril of its fruit which has a very agreeable taste. The dried fruits are like raisins. The seeds yield a medicinal oil. The timber is very hard and durable. *Emblia officinalis* (Amalaki=Hind,

Amia, Chand. Up. 7, 8, 1), a tree of moderate size of S. E. Asia. The fruits are used as a pickle, preserve and as a seasoning in cooked food. The flesh of the fruit contains about 26 p. c. of tannin and the stone about 6 p. c., 25 p. c. from the bark and the twigs and the 23 p. c. in the leaves which are used for tanning leather reddish brown. As a dye on silk pretty brown tints are obtained by the use of the leaves and the color is turned black with iron mordants. The ripe fruit is laxative and very rich in vitamin C, perhaps richest of all fruits. *Symplocos racemosa* (lodrā), a shrub growing in sub-Himalayas from Kumaon to Assam up to 2500 feet, common in Chota Nagpur, and in Burma up to 3000 feet. The bark yields a yellow dye, obtained by simply steeping it into hot-water. It yields an alkaloid which is useful in dysentery which may be given in decoction. *Allium cepa* (onion = palanda; Susruta) is a native of Western Asia. It reached Greece, Italy, W. Egypt at an early date. Onion is represented on Egyptian monuments and is given divine honour. It reached Philippine Islands with the Sanskrit name. It was grown in Jātaka times. It is extensively cultivated and is used in India, China and Japan as a vegetable and a condiment. *A. sativum* (lasunda) is indigenous to south west Siberia. Garlic has powerful antiseptic action in the intestines and on ulcers. *Ricinus communis* (castor-oil plant = aranda) is indigenous to Africa. It was cultivated in Egypt about 3000 B. C. with sesame as the source of oil long before olive. From Egypt it came to Babylonia and then to Persia, from which India got it. The ancient Egyptians extracted the oil by pulping the seeds, boiling the pulp and skimming off the liberated oil; they used it for anointing their body with it and for illumination. In Atharva Veda we find that its application on the head promotes the growth of hair, and Susruta recommends its oil as a purgative. From castor oil sebacic acid is obtained; and phenol which by hydrogenation and oxidation yield adipic acid, an important base for Nylon Resins. The Chinese got it from India and called it *slan*, a corrupt form of *aranda*. Western Malaysia also got it from India, possibly in second century A. D. when it received the reputation as a good purgative and called it *chitraka*, the name of another purgative, *Plumbago zeylanica*. The root of *plumbago indica* was intro-

duced into the vagina to procure abortion in India and in Malaysia. *Calamus rotang* (cane-vetase, Rv. 4, 58, 5) an extensive climber in rich moist soils, possibly a native of Bengal, but found in Central provinces, S. India and Ceylon. It was used for making chairs, baskets, boxes, and for canes. *Bombax malabaricum* (silk cotton tree = *simulā*; Rv. X, 85, 20) occurs from the Himalayas to Ceylon and through the dried parts of Malaysia to Australia with flaming red flowers, but without fragrance. Alexander's soldiers saw this tree and Arrian recorded that the floss which surrounded its seed could not be spun, but was used for stuffing saddles. The smoothness of the floss (Skt. *tuḷā*) prevents its felting. Consequently it was used for stuffing pillows and cushions. The seeds contain 25-30 p. c. oil which can be used like cotton seed oil.

Ceiba pentandra or *Eriodendron anfractuosum* (white silk cotton tree = *kopok* = *safed simul*), possibly of American origin, but is cultivated in southern China, Malaysia, Burma, western and southern India. It is planted near temples. It can be grown from cuttings as well as from seeds. Though the fibers of the floss are longer than and superior to that of *Bombax* but it is too smooth and slippery to be spun. However being soft, buoyant and waterproof (non-hygroscopic) it may be used as cushions and mattresses in moist rainy countries, as it is being used as life belts. The seeds yield about 25 p. c. cotton seed like edible oil. *Butea frondosa* or *monosperma* (*palāsa*, *kimśuka*, Rv. 10, 11, 20), growing in the plains of India, but now spread into China and Java, with bright scarlet flowers. It begins to flower in the spring. And the flowers yield a brilliant yellow dye by simple decoction. The flowers and their deep yellowish extract were sprinkled in the Kāmādeva festival (later converted into Holi) during the spring. An insect living principally on *Butea frondosa* produces a gum resin *lākṣa* (*lac* = *alaka*, Beng. *altā*). The washing of this gum resin produces a deep reddish dye = *shellac*. In ancient India women used to dye their feet and nails with this dye as the ancient Egyptians women used to stain their hands and feet with fresh leaves, pounded with lime of *Lawsonia intermis* or *alba* (*Henna*) and whose flowers were used as offerings to gods and for perfumes, and which the Arabs adopted and the Moslems have introduced in India.

and the hands and feet of Moslem brides are still dyed with henna.

The Chinese perfected the methods of rearing silk worms on mulberry trees (*Morus alba*) as early as 2540 B. C. reeling the silk threads, dying and weaving it under the fostering care of empress Siling, consort of Huan-ti, but they tried to keep the art secret, though they exported this valuable textile. But prosecution drove a number of silk worm rearers to Korea, and a Japanese military expedition in third century A. D. brought some of these rearers to Japan. A few of these Koreans were sent to learn the art and they brought with them 4 Chinese girls in whose honour silk weavers temple was erected at Satsu where they continued their trade. A Chinese princess was married to the chief of Khotan in 419 and at the risk of her life she carried to her land of adoption both the seeds of the mulberry plants and the eggs of the silk worm. Thus the famous Central Asia silk trade began. It became the envy of Rome and led to the formation of silk roads which were designed to facilitate the traffic towards Rome. Within a century and half both Persia and Romans got the knowledge. At the request of Justinian the monks of Sirhind carried the seeds of mulberries and eggs of silk worm to Constantinople in 560 so that Romans might be able to produce raw silk themselves instead of purchasing it from their rival and enemy the Sassanian Persians. The Indian name of *resham* (silk) is from the Pers. *abresham*. The Hindu kings of Cambodia and Siam secured the silk worm from southern China. And possibly they introduced it in Assam and Visnupur of Bengal (*tesar*). The best of the cultivated silk worms in China was *Bombyx mari*. But there are also wild silk moths, producing inferior silk in southern China. *Antheraea pernyi*, a native of Mongolia, is not only the Chinese oak silk moth, the Japanese *Yamamai*, and also the Assamese *Muga* and *Bankura tassar* feed on *Bher-Zyzyphus Jujuba*. *Attacus ricini* is reared on the castor plants in Assam for the production of eri silk, but it is not reelable, is used only for spinning along with the silk wastes of tree silk worms. *Skt. tassara* (Rv. I, 61, 4 = shuttle = shuttle silk) is likely to have been derived from Chinese *tsau* (cocoon) and *tsai* (silk worm), and the Burmese *tsa*. The Chinese *tsau* is also the origin of *Gk. ser*, *Lat. sericum*, *Fr.*

soie, Ger. seiden, Russ. sheolk, Eng. silk. *Carthamus tinctorius* (safflower—*kusumba*) is mentioned in an inscription of Egyptian 6th dynasty and the grave clothes of Egyptian mummies with fragments of the plant in the tombs of 19th dynasty (1800 B. C.). In Kārtikī Purnimā festival, present Rāsa, maidens used to dye their garments with its pretty yellow dye. But unfortunately the colour is not fast. The seeds yield about 25 p. c. edible oil which is often adulterated with ghi. *Aquilaria agalocha* (aloes wood—*aguru* from Malaya *gaharu*; Susruta recommends its fumigation ■■■ anodyne in surgical operations) is found N. E. India and Hongkong to New Guinea. Under certain pathological conditions ■■■ parts of the plants ■■■ saturated with ■ very fragrant oleo-resin. The healthy wood is white, soft and scented when freshly cut. But it becomes very hard with oleo-resin. This resinous wood is burnt as an incense by the Hindus, and the Chinese use it in joss sticks. In the Bower manuscript *aguru* is mentioned as a stimulant and tonic. In Sylhet certain quantity of resin is collected every year to distill from it an essential oil (agar attar) which is esteemed like star of ■■■.

Camellia sinensis (tea—Chinese tu. chā; ming tsai—tea vegetable) are mentioned between 202 B. C. and 85 A. D. Possibly like the Shans and Burmans pickled tea leaves were used with vegetables and meat by the Chinese. ■ is said that Wang Meng, father-in-law of the emperor was fond of drinking tea and set it before his friends. Possibly tea leaf ■■■ chewed earlier still. Japan took up tea drinking from the Chinese in the 4th century and the Arabs about 9th century. In Manipur and Naga Hills ■■■ in Shan states ■■■ acclimatized Chinese tea plants have been found. *Mimusops elengi* (*vakula*) grows in S. India, Bengal, Burma and Ceylon. Its scented star-like flowers fall in large numbers under the tree during the spring, and children and maidens string the flowers through their central corola into necklaces and women decorate their hair with them. A sweet scented water is obtained by distillation of the flowers. *Sesbania egyptiaca* (*jayanti*) ■■■ one of the first garden plants grown in Egypt. It is cultivated all over the country for its flowers. *Sesbania grandiflora* (*vaka*) a small quick growing tree with large white or reddish flowers, ■ native of N. E. Asia and is planted in parks for its flowers and as a shade tree. Its young

flowering shoots are used as a vegetable in curries. *Terminalia arjuna* (*bandhuka*), a large deciduous tree growing on the banks of rivers throughout C. and S. India as far north as Ondh. It yields a clear transparent gum. *T. bellerica* (*beleric myrobalan*; Skt. Bibbitaka), a large deciduous tree growing throughout India, Burma and Ceylon. Its fruits contain a good deal of tannic acid which is used in tanning and dyeing. *T. Catappa* bark is astringent. The kernels yield a valuable edible oil with almond like flavour. *Terminalia tomentosa* (*ajay*), the most widely distributed plant, yielding a copious transparent gum which is used as an incense and cosmetic. The bark and fruits contain a good deal of tannin. The wood is employed for building purposes. *T. chebula* (*chebulic*—*haritaki*), a variable deciduous tree, grows all over the country, yielding a gum. Its black dried fruit (*myrobalan*) is the most valuable of tanning materials, containing about 25 p. c. of tannic acid. *Saraca indica* (*asoka*), a medium-sized tree with dense clusters of brilliant orange-coloured flowers, grows all over the country. It is sacred to the Buddhists and Hindus for under its blossoming branches, Gautama Buddha was born.

Pandanus tectorius or *odoratissimus* (*screw pine*—*ketaki*, Hindi *keron*), a considerably branched screw pine, common on the sea coast from S. India to the Pacific. The scent of the male flower is very powerful. Women tuck its inflorescence in the hair for its voluptuous delightful scent. Scented oil is made from the floral bracts interlaced with sesame seeds. Inflorescence is distilled to make an essence and by enfleurage, its aromatic oil is extracted. From its fibrous leaves, hats and bags are made. Its pineapple like ripe fruit is edible. *Piper betle* (*betel vine*—*tambula*—Hindi *pan*; *Betel* is derived from Malayan *vettila*, or *vernila*, meaning leaf), a native of central and eastern Malaysia, became a cultivated plant in comparatively early times through tropical Asia and Malaysia. In India by the selection of the male plant, fruit is rarely seen. It is called in Sanskrit (*Susruta*), *tāmbula* (Hindi *tāmbuli*); and *nāgavalli* (Guj. *nagwari*, Telugu *nāgavalli*). Indo-Chinese have been fond of chewing betel leaves with camphor, nutmegs and cardamoms for their pungent taste and flavour, and the poorer classes with quicklime, arecanut and catechu as an astringent alkaline mixture for their

mouth and gum. The leaves are chewed for their flavour owing to the volatile phenols like eugenol and pungency due to terpenes. **Piper chaba** (cabbi, Beng. chai), a native of Molocens, cultivated in Bengal, for its aromatic wood and root to be used in curries, is but a variety of **Piper betel**. **Piper cubeba** (cubeba-kabab shini) is a native of Malaysia and Java, and is cultivated in S. India for its berries which are used as a condiment for its aromatic odor and flavour of camphor and peppermint. Oil distilled from cubeba contains terpenes and sesquiterpenes, and as it ages it forms cubeba camphor. **Piper longum** (long pepper=pippali; Pers. pilpil; Ar. fīfil; Gk. peperī; Lat. piper. Theophrastus shows that in the fourth century B. C. both long and black pepper reached the Greeks in Levant. Both the Greeks and the Romans esteemed them highly), a perennial shrub, native of the hotter parts of India from Nepal eastwards to Assam and Bengal, and in the hills of south India. In the time of Pliny, in Rome long pepper was worth twice as much as black pepper. Long pepper contains 4-6 p. c. of piperine and 0.9-1.56 p. c. of capsaicine. The oil distilled from it has an odor suggesting of ginger. **P. nigrum** (black pepper=maricha=Beng. Gol maricha), a native of Western Ghats, but now cultivated in S. India and Assam Hills. Pahlavas introduced it in Java. It is used as condiment. It contains alkaloids piperine and piperidine. The pungent taste is due to a resin and odor to a volatile oil. **Zingiber officinale** (ginger=ādar Av. 4,35,6; eringavera which became zingiberi and in late Latin zingiber and Arabic zanzabil). It was the *Kieng* of the Chinese and it is said that Confucius was never without ginger when he ate. Dried rhizome is *southi*, known in Malay as *south* and the rhizome in Java as *sunti*. Pliny mentions it. Galen has praised its virtues. It has not been found in wild state. It is grown in southern provinces of China. Possibly it was introduced into the Indian adjacent territories, from which it has spread all over the country. **Myristica canarica**, an evergreen tree of E. India (pindi), bearing fruits, half of which consists of fat which is used in candle making as it melts at 39°C. **M. malabarica**, a large tree of the western coast from Konkan southwards, yielding a yellowish oil, used for illumination.

Myristica fragrans (nutmeg=*jaya phala*, *jatri*), a small evergreen tree growing in Moluccas. Throughout Malaysia nutmeg is called *pala*, a corrupt form of Skt. *phala*=fruit which the Pallavas introduced after their conquest. Nutmeg reached Levant through Arab traders in 8th century A. D. It must have reached India earlier from Java, as it is mentioned in *Susruta*. It is likely that the Hindu emperors of Java created this trade. The fruit when ripe splits in halves and through the split is seen the coral red mace and the purplish brown seed. Aromatic substances pervade both these parts, and partly also in the fruit wall mace is the aril. Nutmegs contain 25-30 p.c. aromatic fixed oil. It contains in addition to eugenol, linalol, geraniol, borneol, safrol, and myristicin. The latter is toxic. Taken into the intestines or subcutaneously, myristicin causes degeneration of the liver and inflammation of the intestine. The same oil can be distilled from the mace. So its excessive consumption either with the pan or as a condiment may prove injurious. **Areca catechu** (betel nut=*gubak-sapari*), the slender graceful palm, is a native of Malaysia, possibly Philippine Islands. It is now cultivated in Canton, Amoy, Formosa, coastal regions of S. and E. India. The palm is grown from its seed and begins to bear at 5 or 6 years, and bearing thereafter for about 20 years. But it may live up to 90 years in sterile condition. Its nuts are chewed both when ripe or unripe. The betel nut contains alkaloids arecoline, arecaidine, guvaine, guvacoline, arecaosidine, isoguvaine and choline. Arecoline is toxic, acting like nicotine on the nervous system, but is a vermifuge. Tannin is present with fat and some sugars. Its fragrant flowers are put into the hairs of maidens, particularly brides, for its aroma and beauty. A perfumed water is also distilled from it. The flowers may be eaten as a salad. Its cabbage is also eaten. **Elettaria cardamomum** (cardamom=*elatari*=Beng. *elack*). Theophrastus mentions 2 kinds of cardamoms including amomon, reaching Greece in 4th century B. C. through Media. Romans however preferred *Elettaria*. *Susruta* mentions *ela*. In Java *Amomum* is even called *ela*, which term was given by the Hindu rulers there). *Elettaria*, a perennial herb with much branched inflorescences is common in the southern half of the western ghats above 2500 feet

and in Ceylon towards 3000 feet. Its fruits are used as a spice to sweeten the breath, and generally chewed with *pān*. *Amomum subulatum* (greater cardamom, Beng. *bars ilāchi*) grows in Nepal and Bengal. The seeds have an agreeable aromatic camphoraceous taste. It is carminative and stomachic. It is chewed either with *pān* or alone to sweeten the breath. Some species of *Amomum* grow in S. E. Asia, particularly in Java, as *Amomum kiplaga* which is also used there to sweeten the breath. *Gynocardia odorata* is a tree of north-eastern India where it grows in dense forests. The fruit flesh in which the seed lies is gelatinous and fragrant. The seeds are sometimes sold as chaulmoogra seeds, but it contains no chaulmoogric acid, rather a glucoside yielding hydrocyanic acid. So it is no good for leprosy. *Hydnocarpus kurzzi* (*chaulmoogra*) is a forest tree of Siam and Burma, but extends to Assam. Its seeds contain chaulmoogric and hydnocarpic acids. But as the oral administration or injection of the oil do not prove satisfactory, the sodium salts of hydnocarpic acid or ethyl esters of chaulmoogric and hydnocarpic acids have proved very effective in the treatment of leprosy. Ethyl chaulmoograte is a colourless oil, boiling at 280°C. *Jasminum officinale* (Beng. *juti*) is of Persian origin, and from Persia it was taken to China. It grows all over the country and its white flowers are esteemed by the ladies to decorate their hair. *J. grandiflorum* (*jāti*: Hindi *chāmeli*), a native of N. W. Himalayas, is extensively cultivated in Northern and Western India for its large fragrant flowers which yield the essential oil of *Jasmina*. *J. sambac* (*mallikā*) is of Persian origin. It reached Egypt in Greco-Roman times. It reached China early in the first century A. D. from Hu which is Persia and Hellenistic orient. The Chinese name is *mek* which dates about 300 A. D. In Siam it is called *mal*, and in Malaya *melali* = Skt. *mālātī*, ostensibly therefore received from India. In China the flowers are used to give aroma to the teas. It is extensively cultivated in India where its scented flowers are used by women to decorate their hair, and garlands are made out of them to be worn in the neck of men and women alike for its delicious perfume. *Jasmine* = Pers. *yasmin*.

Ocimum basilicum (Hindi *babul*, sweet basil) was used in

Persia to make an ointment of the Achæmenides. So it is called royal and sweet basil, okimon of Hippocrates; a native of Persia. It is widely cultivated, aromatic and edible. It has mucilaginous seed coats, which when placed in water liberate a copious jelly which is demulcent, stimulant, diuretic and diaphoretic. A yellow oil with a pleasant odour, containing about 65 p. c. of methyl-chavicol in addition to linalol can be obtained from seeds of *ocimum*. Camphor is also obtained from some species. *Ocimum sanctum* (*tulasi*), a native of Arabia and N. India, is cultivated near Vishnu temples. It is supposed to drive away mosquitoes. *Vitex negundo* (*sindhu-vāra*), a bush attaining sometimes 15 feet in height, is found from Africa to the Pacific. Its roots and leaves are regarded as a tonic and febrifuge. In China its fruits are medicinally used for the same purpose. *Averrhoa bilimbi* (*labali-bimbi*), a Malayasian shrub, has either been introduced or spread into India. It is cultivated for its pleasant acid fruits and flowers which are used in curries or pickled with sugar. The juice of the fruit removes stains from cotton cloths, and like soap can be used to wash dirt from the body. *Anthocephalus* or *Nauclea cadamba* (*kadamba*) is a deciduous tree, found from sub-Himalayan Nepal eastwards to Burma and southwards into Malabar Ghats. Pahlavas introduced it into Java, and it was held sacred by them. It is *Malaya Kadam*. The tree flowers and fruits at five years and forwards. The flowers are yellowish in large globose pendent heads. The receptacle becomes fleshy, and edible compound fruit is formed about the time of periodic rainfall. The tree grows very rapidly. It may be 80 feet high at its fourth year and about 100 feet high at its 20th year, after which the growth ceases. The wood is soft white with a yellowish tinge. *Michelia champaca* (*campaka*), an evergreen tree with pretty yellowish scented flowers, grows in Nepal, Bihar, Bengal, Assam. They have been introduced in Java (*chempaka*) and Siam (*chompāh*) where they are sprinkled on bridal beds, and brides are bathed in a cosmetic made with it. On distillation of fresh flowers a fragrant perfume containing iso-eugenol is secured. *Mesua ferrea* (iron wood—*nāga kesara*), a beautiful small tree with white showy flowers and leaves coated with wax on the back, grows

from the North-eastern Himalayas to Malaya Peninsula. It was introduced in Java by the Pahlavas. Its wood is very strong. Its seeds contain 75 p. c. of oil which was used for illumination. The bridal beds and cushions are stuffed with its fragrant stamens. It is sacred to Kāmadeva whose bow was made of its bent wood and its flowery shaft made of its stamens. *Wisteria sinensis* (Blue Acacia), an attractive large climbing shrub with handsome foliage and long racemes of large pale purple or violet flowers, a native of China, is now cultivated in N. India for covering bowers and arbors. *Quisqualis indica*, a scandent deciduous shrub, indigenous of Malaysia and west Africa, is now cultivated in Indian gardens for its all year round flowers in clusters. The flowers are white, sweet-scented, open at night, but turn pink at daybreak. The fruits are anthelmintic. *Nelumbium nelumbo* (lotus = panderika : X, 149, 8 - padma) was brought to Egypt by Persians, where it is found in 705 B. C. The lotus flower was sacred to Isis and Lakshmi. A cooling and astringent paste is made out of its petals and stamens ; the rhizome contains a good deal of starch ; and fresh and dried rhizomes are used in meat and fish curries. The seeds, ripe and unripe, are eaten raw as nuts. The seeds contain 62% of starch, 18% of protein, 2% of fat and 12% of moisture. The embryo however is bitterish and contains an alkaloid Nelumbine which is tonic. The Chinese use the embryo in spermatorrhoea. At Rhas Sharma in an ancient tomb of the Luites (Lata an allied Mitanni tribe who settled in Iranian Luistan) of 14th century B.C. a bronze statue of Teshub (Kasaba) and a golden statue of his erect nude consort, holding lotus flowers in each hand have been found. *Trapa bispinosa* (mutali Av. 4, 35, 5 : waternut = sringara), an aquatic plant, found floating on the surface of lakes and tanks all over the country, especially in Kashmir, abounding in starch. It is rich in manganese and is useful in bilious affections and in diarrhoea. The fresh nuts are picked and eaten as fruits or cooked as a vegetable. The nuts are dried and ground into flour. *T. bicornis* (kasuri), a native of S. China, now grown in Java and N. India. *Castalia gigantea* of Australian origin is a giant water-lily ; the flowers are sometimes a foot across with hundreds of stamens of blue color. The Egyptian lotus was of also *Castalia* genus. This blue lotus is

mentioned in Rām. *Victoria regia* is of Amazonian streams. Its leaves are almost six feet across, circular in shape with an upturned rim several inches high. These remarkable floating leaves whose tissues are full of air spaces can support 50 to 100 kilos of weight. The water-lily-like flower is about a foot across. The first time the lily opens, the inner petals over the stigma remain unexpanded and the flower is creamy white with delicious fragrance. It closes next forenoon to open again at dark, this time expanding to its fullest extent, but has become rose-red in color with a disagreeable odor. The flower is then closed and is later withdrawn beneath water. The fruits are like peas, hidden in the cells of dilated tissues or globular prickly capsule about as large as coconut, and starchy nuts are used as food. *Dichroa febrifuga* (*chang-shan*), a shrub found from China, N. E. India to Java and Philippines. It contains an alkaloid *dichroin*. An extract of the herb, even administered by the mouth 2 or 3 times daily for about 5 days controls tertian malaria as promptly as quinine; its decoction controls temperature, caused by *B. coli*.

Bambusa (*Malaya bambu* = Sk. *vansa* = bamboo) is the tallest of grasses. It is found in warm and humid parts of E. Asia, spreading south-east, having numerous domestic uses.

Crocus sativa (saffron-kunkuma) was cultivated in Cilicia and Greece. It is mentioned by Homer and Hippocrates. It was a royal colour of early Greek times. Later it was strewn in Greek courts, theatres and Roman baths. It was used as a sacred anvil, the favorite of the heterei. The Phœnicians dyed the marriage vests of the brides with it; the priests used it in their ceremonies. It is cultivated in Persia and in Kashmir. And saffron, the aromatic and pungent dried orange coloured stigmas and styles, is used to make a reddish coloring auspicious mark on the bride's forehead and to make bridal saffron cakes in Europe.

Opuntia (Ta. *Aparṇā* = Nagaphenā; Gk. *Opous*, Lat. *Opus*). A cactus like plant *herba opuntia* is mentioned by Pliny, growing in Locris in Greece; a genus of cactaceous plants, comprising some 150 species; they are fleshy shrubs with rounded woody stems and numerous succulent branches, dotted over in spiral lines with small fleshy caducous leaves (*Eka-parṇā*) in the axile of which are the areoles or tufts of barbed or hooked bristles,

usually accompanied by spines. The flowers are mostly yellow or reddish yellow, turning purple from few hours to 5 days, succeeded by pear-shaped or egg-shaped fruits (prickly pears—*Ela-patala*) whose soft fleshy rind is tender, sweet and juicy, having broad scar at the top, mostly furnished with tufts of small bristles. *O. coccinellifera*, the *nopal* of Mexico, now growing in Rajputana and Deccan where the cochineal insect (*Coccus cacti*) is grown for the production of scarlet or crimson tincts, now mostly replaced by aniline dyes; a flour is prepared from its seeds, and the young shoots are eaten. *O. Tuna*, a native of Mexico, now growing in Deccan. Its fruit contains a reddish juicy pulp, containing grape sugar, which is eaten, used as a water color and for coloring confectionary. A tincture made from it is used as a relief in cardiac palpitation. *O. vulgaris* (prickly pear), a native of tropical America, now cultivated in many countries for its fruits. The pulp of the ripe fruit contains a mucilage of an acid reaction, a red matter useful as a dye and glucose. The seeds yield 7% amber-colored fatty oil. Its succulent stems, deprived of spines, may be used as a fodder. But the plant is susceptible to a fungus disease.

Pineapples (*Ananas comosus*, of Brazil, known as *nana*, of ancient cultivation in tropical America, and before the end of 16th century, it was taken to all parts of the east. Beng. *ānāras*. Lower parts of the fruit are the sweetest. Races differ in colour of skin and flesh, size and shape, the depth to which eyes are set, flavor and juice. It contains about 7.5 p. c. cane-sugar. Unripe fruits contain a glucoside which acts as a violent purge, and is used as an abortifacient. The fruit, ripe or unripe contains *bromelín*, a vegetable trypsin of quick proteolytic action, capable of acting in acid, alkaline or neutral media. Light wine and vinegar may be made from the fruit sap. Ripe fruit is also diuretic and may cause strong uterine contractions. Leaf fibres, silky and strong, may be woven into clothes. **Custard apples** (*Annona reticulata*, *A. muricata*, *A. squamosa* of Mexico, known as *anona*; Mal. Beng. *nonā*); **Papaw** (*Carica* of Nicaragua (papaya) and Brazil (mameo) reaching Malabar before 1587; its delicious fruit is not only rich in sugar, papain, but also in calcium, vitamin A nearly 6 times of the orange, and also slightly B, C and D. **Guavas** (*Psidium*

guajava of Jamaica, Haiti and Mexico, known as *guayabas*; transplanted by the Spaniards in the Philippines as *guayabos*; the Portuguese in Goa called it *peera*, that is, pear, from which it is called in Beng. and Guj. *piyārā*, and in Malayalan *peraka*. Persians called it *amrud*, a Persian name for pear, and by this name of *amrud*, it is still known in N. India); **Potatoes** (*Solanum tuberosum* of the lofty valleys of the Andes. A variety which has chromosome number $2n=24$, called *papa amirillo*, was cultivated about 800 A. D. indicated from a pottery found in a burial site. The Spaniards took the Andean potatoes as their ship's provision in 1562. The English captured the vessel and took it to Ireland where potatoes began to grow from which it became popular in Europe. Soon after the Spaniards took it to the Philippines. The Dutch introduced it in the mountains of Java and it was brought to India about 1615. Japan cultivated it in 1766); **Maize** (*Zea mays* of Peru is of pre Inca origin. At Tacna Arica of Chili ears of maize and 18 species of marine shells, buried in soil, now 85 feet above the sea level, have been found); **Chillies** (*Capsicum annum*; *C. frutescens*. Columbus brought the seeds in 1492 from Brazil. The Dutch introduced them in Java and in Bengal); **Groundnut** (*Arachis hypogaea* of S. E. Brazil. In 1601 groundnuts were used as food on the slave ships that crossed the Atlantic. The Dutch introduced it in Java where the Chinese cultivated it and became known as *Kachang China*=Beng. *chini* *badām*, Bengal got it from Java or China, as in Bengal it is called *chini* *badām*. Madras got it from Manila where it is called *Manila kotaa*. The nut contains 43 p. c. oil, 29 p. c. of albuminoids, 27 p. c. of minerals, 2% of cellulose, 4 p. c. of moisture. Oil consists of glycerides of oleic and linolic acids. Albuminoids are arachin and conarachin which are very rich in nitrogen; artificial milk may be made out of it. Husks might be used for paper-making alcohol, acetic acid and acetone. From the albuminoid a filament ardile may be made which can be woven into a cloth softer and and glossier than silk, but having the texture of fine wool); **Tobacco** (*Nicotiana tubacum*. Columbus found in 1492. Amerinds smoking tobacco for relaxation and for relief against asthmatic spasms. And in

Spain tobacco seeds were planted in 1519. In 1561 it was planted in Belgium; in 1586 in England through Raleigh. Spanish missionaries introduced it in Luzon; the Portuguese introduced its cultivation in Bijapur in 1605; **Cinchona** (some Peruvian travellers of the Andes were suffering from Malaria on a small lake. They became very thirsty. They were compelled to drink the unpalatable water of the lake, embittered by the fallen leaves and twigs of Cinchona. They got cured. The fame of the lake spread for its fever-curing waters. But it was later found out that curative agent was the Cinchona tree which surrounded the lake. In 1636 the wife of the Spanish viceroy Countess of Cinchon was cured of her fevers by the Cinchona bark powders. In 1640 the Countess of Cinchon brought a large quantity of the bark in Spain. Its fame spread all over Europe. In 1654 the Dutch cultivated it in Java; in 1860 the English planted in the Nilgiris and Ceylon; in 1862 in Travancore, in 1884 in Sikkim); Sweet Potato (*Ipomoea batata* of Honduras from where Columbus brought it to Spain. The Dutch introduced it in Java and Bengal. It contains about 20 p. c. of starch which by baking is converted into a soluble form); **Tomato** (*Lycopersicum esculentum* = Mex. *Tomatl* - love apple of Mexico. The Spaniards carried it across the Pacific to the Philippines. The Dutch introduced it into Malayasia between 1653-52, and shortly after in India. It contains about 0.04 mg. of antiscorbutic vitamin C and 50 units (1 = 0.08 μ) of fat-soluble antihemorrhagic vitamin K); **Pumpkin** (*Cucurbita maxima* - Beng. *mithe kumra*; it grows to an enormous size, sometimes as heavy as 100 kilos of sweetish reddish flesh which is made into *pumpkin pie*); **Squash** (*Cucurbita pepo* - vegetable marrow of N. American origin); **Tapioca** (*Manihot utilisima* = Cassava of Ecuador, Portuguese introduced it in Travancore. Some varieties contain hydrocyanic acid in its root meal which is destroyed by washings in running water. The root contains 26 p. c. starch, 1.5 protein. As the pure starch is not easily liable to ferment, it is very useful in fermentative diarrhoea); **Sun flower** (*Helianthus annuus* - Beng. *suryamukhi*, a native of America from where it was brought to Spain in 1537 as a garden flower; was grown up as an oil crop in Bavaria in 1725. The oil is edible. Russians grow it in large

quantities and habitually eat the seeds ; introduced from Russia as a garden flower) ; Marigolds (*Tagetes erecta*, *lucida*, *patula* of Mexico = Beng. *Gandā* ; *T. glandulifera* of Peru) ; Yellow Oleander (*Thebattia nerifolia* of Brazil) ; The Rubber tree (*Hebea brasiliensis* of the Amazon region which not only supply latex, but its seed kernels contain also 45-50 p. c. of drying oil ; the life of the plant is about 100 years ; its seeds were planted in the Malayas, Ceylon and Travancore) ; have been introduced mostly by the Spaniards, Portuguese and the Dutch into India. *Eichharnia crassipes* (water hyacinth) is a floating plant, forming dense masses, a native of warm slow-flowing rivers of S. America. If the water is shallow, it roots in the mud under the water, but rooting is unusual and unnecessary to it. Its blue flowers are very pretty. It was brought to Java in 1894, to Tokio in 1903 and Hongkong in 1908. From Hongkong it was taken to Singapur and Ceylon in 1904. From Ceylon it was taken to Bengal where it is choking sluggish streams, canals and water ponds by its rapid growth. The Chinese however cultivate them in their fish ponds where the fish find food among its roots ; and leaves, petioles and inflorescence are used for fattening the pigs. When the hyacinth is rotted in a concrete pit it contains 0.45 p.c. nitrogen, 0.23 phosphoric acid, 2.61 potassium chloride and 24.95 organic matter. So it is a valuable fertilizer like cow dung or *Pistia stratiotes* (floating *pāñā* found in ponds of tropical Asia). Cowdung contains 0.46 nitrogen, 0.23 phosphoric acid, 0.25 potash and 25.56 organic matter. *Pista stratiotes* contain 0.85 nitrogen, 0.32 phosphoric acid, 2.17 potash, 24.25 organic matter. The fibres in the stems of water hyacinth can be made into twines, thick cardboard or brown wrapping paper ; mixed with jute stem it can be made into a valuable plastic ; alcohol, acetone and glucose can be manufactured from it. Due to the leaching effect of the heavy rainfall, the soils of E. Bengal are generally deficient in lime, potash and phosphoric acid. As water hyacinth and *pistia* contain about 5 times more potash than cowdung, instead of being pests and malarial breeders they can be utilized easily to the economic prosperity of the province. Mixed and decomposed with firm vegetable and animal wastes, including urine, it will make a valuable fertilizing compost, enriching the soil and increasing its productivity.



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